Recording requested by and mail to:

City Clerk
City of Beaumont
550 E. Sixth Street
Beaumont, CA 92223

SPACE ABOVE THIS LINE FOR RECORDER'S USE
EXEMPT FROM RECORDER'S FEES PURSUANT TO GOVERNMENT CODE SECTION 6103 AND 27383

APN:

STORM WATER MANAGEMENT WQMP/BMP FACILITIES

COVENANT AND AGREEMENT NO. _

City of Beaumont, Riverside County, California

THIS COVENANT AND AGREEMENT is made and entered into this of 2019, by and between DAVID EMELINESCHUELKE ("Owner"), and the City of Beaumont, California, ("City").

The Owner hereby certifies I am (we are) the sole owner of certain real property located at 202 EAST 3RD ST (Site Address) in the City of Beaumont, County of Riverside, State of California, more specifically described in **Exhibit "A"** and depicted in **Exhibit "B"** ("Property").

The Owner covenants and agrees to comply with the Project Water Quality Management Plan ("WQMP"), attached hereto as **Exhibit "C"**, providing for storm water quality treatment within the confines of the Property.

The Owner covenants and agrees that the health, safety and welfare of the residents of the City of Beaumont, require that the Best Management Practice ("BMP") facilities, more specifically described in the WQMP (for example bio- swales, catch basins, roof drains and appurtenances) be constructed and maintained to minimize pollutants in urban runoff by the Owner.

The Owner further covenants and agrees as follows:

1. The on-site storm water management/BMP facilities mentioned above shall be constructed by the Owner at its sole cost and expense, in accordance with the plans and specifications identified in the WQMP approved by City.

2. The Owner shall adequately maintain the storm water management/BMP facilities in a manner assuring peak performance at all times, including source control BMPs at all times as its sole responsibility, at its sole cost and expense. This includes all pipes and channels built to convey storm water on the Property, including

catch basin inserts, underground detention ponds, swales and vegetation provided to control the quantity and quality of the storm water. Adequate maintenance is herein defined as good working condition so that these facilities are performing in accordance with their design functions continuously at all times.

3. The Owner shall annually inspect the storm water management/BMP facilities mentioned above and submit an inspection report annually to the Public Works Department by the anniversary of the date of this Agreement of each year. The purpose of the inspection is to assure safe and proper functioning of the facilities. The inspection shall cover the storm water management BMPs listed in the WQMP such as bio-swales, catch basins and related filter units, etc. Deficiencies shall be noted in the inspection report and corrected by Owner promptly.

4. The Owner hereby grants permission to City, its authorized agents and employees, to enter upon the Property and to inspect the storm water management/BMP facilities, take samples and perform testing whenever the City deems necessary and as required by the City's most current National Pollutant Discharge Elimination System (NPDES) Permit. The purpose of the inspection, testing and sampling is to follow up on apparent and reported deficiencies and/or to respond to citizen complaints and meet the requirements of the City's NPDES Permit issued by the State Water Resources Control Board – Santa Ana River Region. The City shall provide the Owner with advanced notice of entering upon the Property, except in the event of an emergency, as determined by the City. The City shall provide the Owner copies of the inspection findings and a directive to commence with the repairs if necessary. Owner or Owner's successors or assigns shall pay City for all costs incurred by City in the inspection, sampling, testing of the BMPs within thirty (30) calendar days of City invoice.

5. In the event the Owner fails to maintain the storm water management/BMP facilities in good working condition acceptable to the City, upon five (5) days advanced written notice, the City may enter upon the Property and take whatever steps necessary to correct deficiencies identified in any inspection report and to charge the costs of such repairs to the Owner the cost of which shall constitute a lien against the Property. In the event of an emergency, as determined by City, advanced notice as aforesaid, shall not be required. Notwithstanding the forgoing, it is expressly understood and agreed that the City is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation to the City.

6. The Owner will perform the work necessary to keep these facilities in good working order as appropriate. The maintenance schedule for the storm water management BMP facilities (including sediment removal) is outlined in the approved WQMP and the schedule must be followed at all times. In the future, City of Beaumont may adopt an annual Stormwater Inspection Fee that would be assessed to the Owner.

7. In the event the City, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials and the like, the Owner, its successors and assigns shall reimburse the City upon demand, within thirty (30) days of receipt thereof for all actual costs incurred by the City hereunder.

8. This Agreement imposes no liability of any kind whatsoever on the City. Owner agrees to indemnify, defend (with counsel reasonably approved by the City) and hold harmless the City and its authorized officers, employees, agents and volunteers from any and all claims, actions, losses, damages, and/or liability arising out of this Agreement from any cause whatsoever, including the acts, errors or omissions of any person and

for any costs or expenses incurred by the City on account of any claim except where such indemnification is prohibited by law. This indemnification provision shall apply regardless of the existence or degree of fault of indemnitees. The Owner's indemnification obligation applies to the City's "active" as well as "passive" negligence but does not apply to the City's "sole negligence" or "willful misconduct" within the meaning of Civil Code Section 2782, or to any claims, actions, losses, damages, and/or liabilities, to the extent caused by the acts or omissions of any third party contractors undertaking any work (other than field inspections) or other maintenance on the Property on behalf of the City under this Agreement.

9. This Agreement shall be recorded with the County Recorder for the County of Riverside and shall constitute a covenant running with the land, equitable servitude and lien against the Property, and shall be binding on the Owner, its successors, assigns, transferees, administrators, executors, heirs, encumbrancers and any other successors in interests, including any homeowner's association.

10. In addition to any remedy available to City under this Agreement, if Owner violates any term of this Agreement and does not cure the violation within the time already provided in this Agreement, or, if not provided, within thirty (30) calendar days, or within such time authorized by the City if said cure reasonably requires more than the subject time, the City may bring an action at law or in equity in a court of competent jurisdiction to enforce compliance by the Owner with the terms of this Agreement. In such action, the City may recover any damages to which the City may be entitled for the violation, enjoin the violation by temporary or permanent injunction without the necessity of proving actual damages or the inadequacy of otherwise available legal remedies, or obtain other equitable relief, including, but not limited to, the restoration of the Property and/or the BMPs identified in the WQMP to the condition in which it/they existed prior to any such violation or injury.

11. Owner shall provide printed educational materials with any sale of the Property which provide information on what storm water management facilities are present, the types and locations of maintenance signs that are required and how the necessary maintenance can be maintained.

12. Owner shall provide actual notice of this Agreement and its terms to any respective buyers or successor(s) in interest.

13. In order to be valid, amendment or change to this Agreement including the WQMP and BMPs requires an amendment executed by the City and Owner which is recorded with the Riverside County Recorder.

WITNESS the following signatures:

OWNER:

By: David Schuelke

Name: DAVID SCHUELKE

Title: _____

By: Emeline Schuelke

Name: Emeline Schuelke

Title: _____

CITY OF BEAUMONT
a Municipal Corporation

BY:

_____
Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
John Pinkney, City Attorney

APPROVED AS TO CONTENT:

_____
Jeff Hart, Dir. Of Eng./Public Works

All signatures on this Agreement on behalf of the Owner must be acknowledged before a Notary Public. In the event that the owner is a corporation, the President/Vice President and the corporate secretary of the corporation must sign.

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT **CIVIL CODE § 1189**

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of Riverside)

On 11/09/2022 before me, Monica Hernandez, notary public
Date *Here Insert Name and Title of the Officer*

personally appeared David Schuelke and Emeline Schuelke
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that ~~he/she~~/they executed the same in ~~his/her~~/their authorized capacity(ies), and that by ~~his/her~~/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

MONICA HERNANDEZ
Notary Public - California
Riverside County
Commission # 2279173
My Comm. Expires Mar 28, 2023

Signature _____
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though this section is optional, completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: _____ Document Date: _____

Number of Pages: _____ Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____	Signer's Name: _____
☐ Corporate Officer — Title(s): _____	☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General	☐ Partner — ☐ Limited ☐ General
☐ Individual ☐ Attorney in Fact	☐ Individual ☐ Attorney in Fact
☐ Trustee ☐ Guardian or Conservator	☐ Trustee ☐ Guardian or Conservator
☐ Other: _____	☐ Other: _____
Signer Is Representing: _____	Signer Is Representing: _____

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of Riverside)

On _____, 2019, before me, _____, notary public, personally appeared _____ who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature: _____ (Seal)

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of Riverside)

On _____, 2019, before me, _____, notary public, personally appeared _____ who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.
WITNESS my hand and official seal.

Signature: (Seal)

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of Riverside)

On _____, 2019, before me, _____, notary public, personally appeared _____ who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature: _____ (Seal)

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of Riverside)

On _____, 2019, before me, _____, notary public, personally appeared _____ who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.
WITNESS my hand and official seal.

Signature: (Seal)

EXHIBIT "A"

LEGAL DESCRIPTION

Apn: 418-200-003

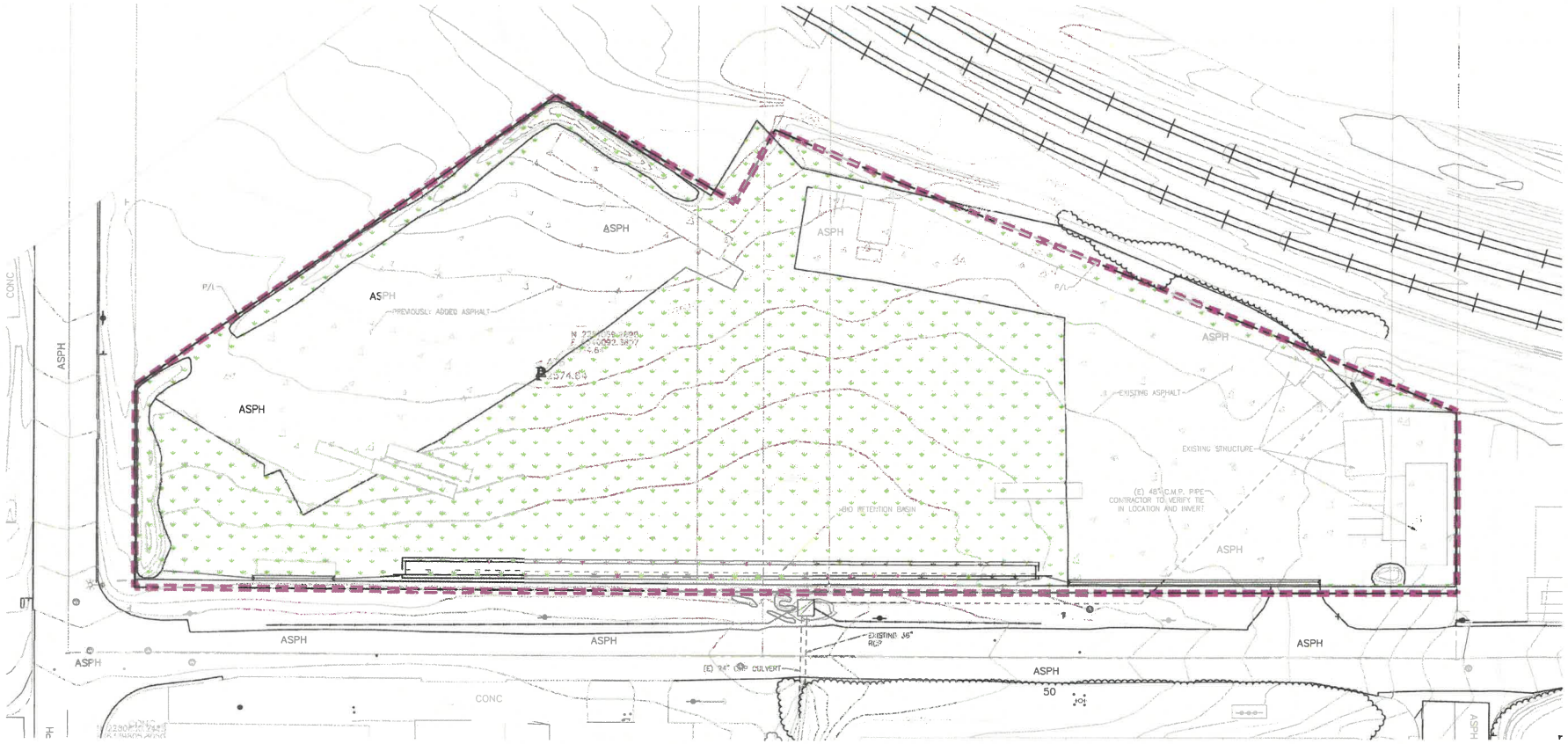
1.97 ACRES M/L IN POR LOTS 9, 11, 12 & 13 BLK 132 MB 006/016 SB AMENDED MAP OF THE TOWN OF BEAUMONT FOR TOTAL DESCRIPTION SEE ASSESSORS MAPS Lot 9 BLOCK 132.

Apn: 418-200-004

1.65 ACRES M/L IN LOTS 8, 9, 11 & 12 BLK 131 MB 006/016 SB AMENDED MAP OF THE TOWN OF BEAUMONT Lot 8 BLOCK 131.

Apn: 418-200-005

POR LOT 10 BLK 131 MB 006/016 SB AMENDED MAP OF THE TOWN OF BEAUMONT Lot 10 BLOCK 131.



LEGEND

- PROPERTY BOUNDARY
- CENTERLINE
- LANDSCAPE AREA
- IMPERVIOUS AREA

PROJECT AREA BREAKDOWN

PROJECT TOTAL AREA	164,475 SF
PROJECT PAVEMENT AREA	79,832 SF
PROJECT LANDSCAPE AREA	84,643 SF

PW#2022-0085

DIGALERT — Call 2 Working Days Before You Dig! 811

BENCHMARK:
IN BEAUMONT, AT THE JUNCTION OF CALIFORNIA AVENUE AND FIFTH PLACE, 28.9 M (94.8FT) WEST OF THE AVENUE CENTERLINE, 7.7 M (25.3 FT) SOUTH OF THE CENTERLINE OF FIFTH PLACE, 1.1 M (3.6 FT) NORTH OF A GUY WIRE, 0.79 M (2.6 FT) SOUTH OF A POWER POLE, 0.18 M (0.6 FT) EAST OF A WITNESS POST.
THE MARK IS 0.6 METERS W FROM A SECOND WITNESS POST. THE MARK IS ABOVE LEVEL WITH THE AVENUE.
ELEV. 2576.61, NGVD 29

ENGINEER

BY	MARK	DESCRIPTION	APPR.	DATE
		REVISIONS	CITY	

BLUE Engineering & Consulting, Inc
9405 BASELINE RD., STE. B-111, RANCHO CUCAMONGA, CA 91701
(909) 942-6567

ANGEL CESAR, P.E. — DATE
R.C.E. 87222 EXP. 09/30/23

REGISTERED PROFESSIONAL ENGINEER — ANGEL CESAR — No. 87222 — CIVIL — STATE OF CALIFORNIA

DESIGN BY:
DRAWN BY:
CHECKED BY:
SCALE:
DATE:
JOB NUMBER:

BEAUMONT — CALIFORNIA
PUBLIC WORKS DEPARTMENT
550 E. 6TH ST, BEAUMONT, CA 92223

Reviewed By: _____ Date: _____ STAFF ENGINEER
Recommended for Approval By: _____ Date: _____ PRINCIPAL ENGINEER
Approved By: _____ Date: _____ CITY ENGINEER

CITY OF BEAUMONT, PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
550E. 6th St. Beaumont, CA 92223
TEL: (951) 769-8520 FAX: (951) 769-8526

CITY OF BEAUMONT, CALIFORNIA
GRADING PLANS FOR:
202 E. THIRD STREET
APN. 418-200-003, -004, -005

DIAGRAM OF PROPERTY

SHEET 1 OF 1 SHEETS
FILE NO:

WQMP Basin Maintenance agreement

202 E. Third Street, Beaumont, California

This agreement is between the property owner, David and Emeline Schuelke, and their Tenant Jose L. Garcia with G & G Pallets.

Due to the installation of asphalt on site, the City of Beaumont has requested a Water Quality Management Plan to be put in place to handle the excess drainage off-site. The Tenant has commissioned the proper studies, at their own expense, to satisfy the request of the city.

G & G Pallets accepts all responsibility of the installation of the trench used to handle the excess flow, including all materials, contractor fees, City Fees and Surveying fees. In addition, G & G Pallets agrees to pay all maintenance costs associated with the drainage of this site, both on-site and off-site.

In the event G & G Pallets fails to maintain the drainage trench and/or drainage pipes associated with this installation, the property owners will hire a contractor to do the work, at the expense of the Tenant. The Tenant will be responsible for any fees associated with this work, including City fees and any City or County Fines for Tenant failing to maintain the Drainage Trench.

Any litigation necessary will be filed in Riverside County, State of California. The losing party shall pay all fees and Attorney fees of the prevailing party. This agreement is binding on all parties, including the businesses and all persons signing as individuals as well.

Signed this 9th day of ~~October~~ NOVEMBER, 2022 by each of the following:

Jose Garcia, G & G Pallet

David Schuelke

Emeline Schuelke

Project Specific Water Quality Management Plan

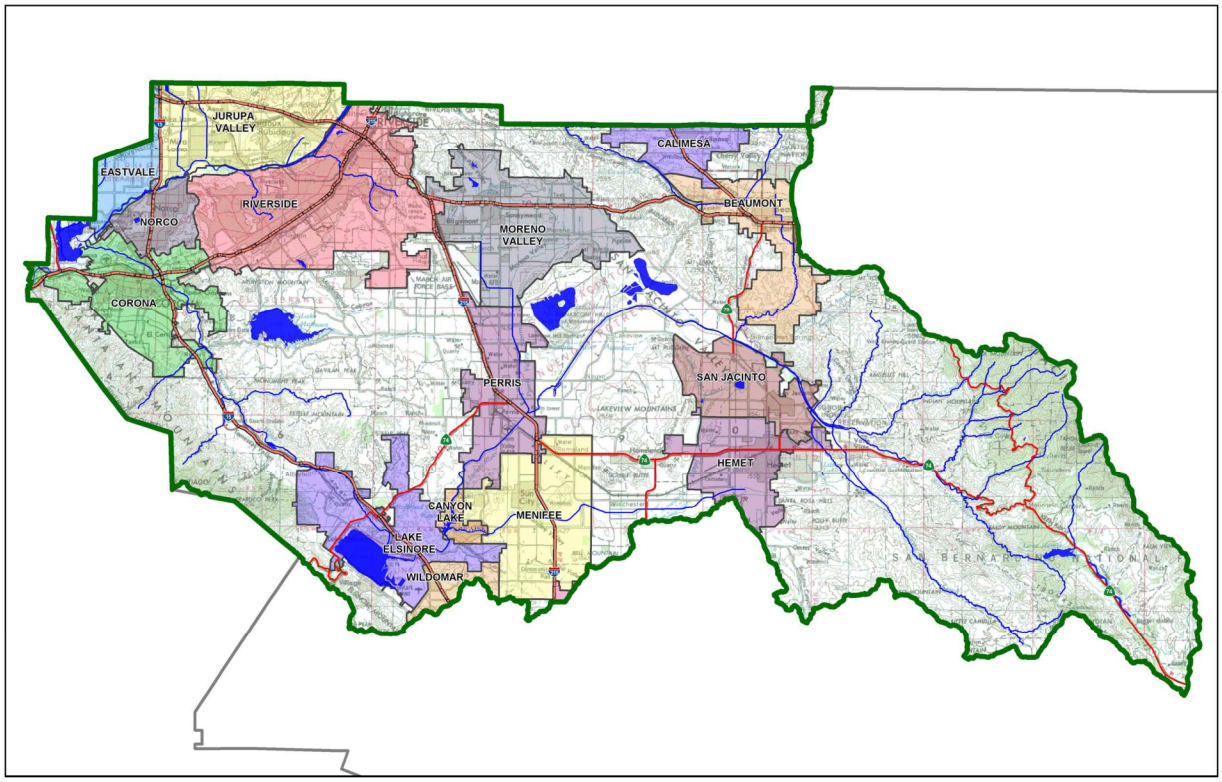
*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

City of Beaumont
PUBLIC WORKS
APPROVED
Reviewed by: Robert L. Vestal
09/15/2022 1:51:05 PM

Project Title: 202 E. Third Street

Development No: -

Design Review/Case No: PW2022-0878



☐ **Preliminary**
☒ **Final**

Original Date Prepared: 05-09-2022

Revision Date(s): 07-19-2022, 08-02-2022, 08-19-2022

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**
Template revised June 30, 2016

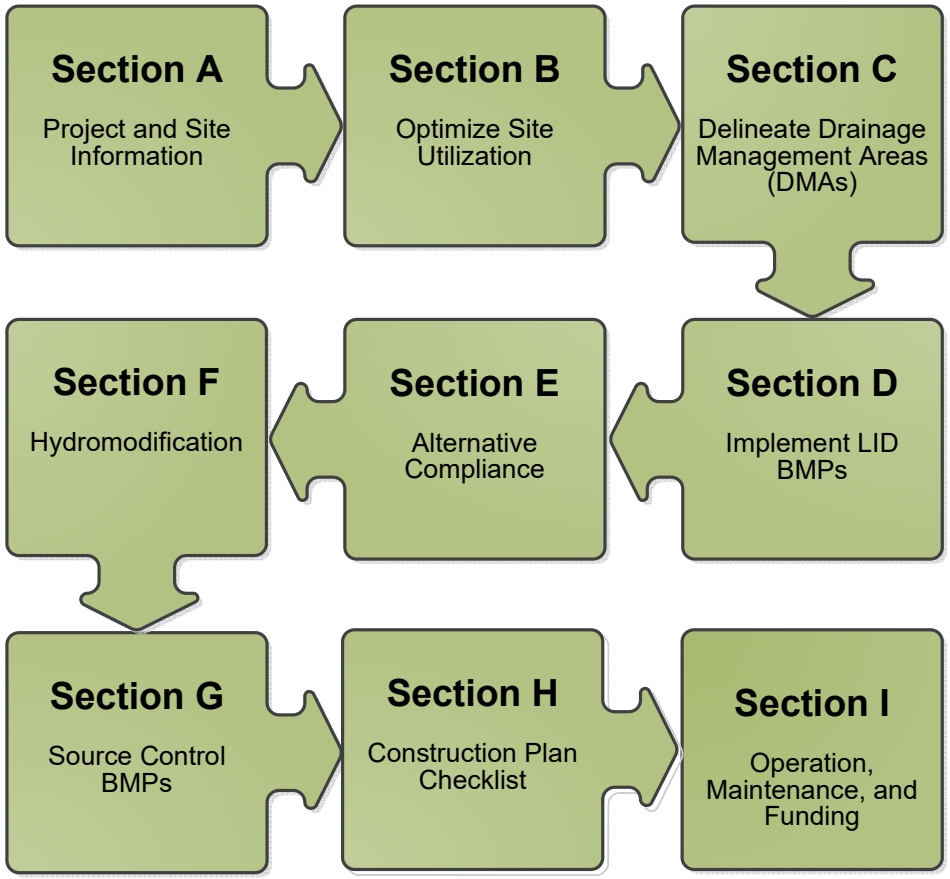
Contact Information:

Prepared for: p
Premium Land Development, LLC.
Craig Heaps
35109 Avenue C, Yucaipa CA 92399
909-283-8588

Prepared by:
Blue Engineering and Consulting, Inc.
9320 Baseline Rd., Ste. D
Rancho Cucamonga, CA 91739
909-248-6557

A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Premium Land Development, LLC. by Blue Engineering and Consulting, Inc. for the 202 E. Third Street project.

This WQMP is intended to comply with the requirements of City of Beaumont for APN: 418-200-003, -004, -005 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under City of Beaumont Water Quality Ordinance (Municipal Code Section8.10).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

Table of Contents

Section A: Project and Site Information 6

A.1 Maps and Site Plans 6
A.2 Identify Receiving Waters 7
A.3 Additional Permits/Approvals required for the Project: 7

Section B: Optimize Site Utilization (LID Principles) 8

Section C: Delineate Drainage Management Areas (DMAs) 10

Section D: Implement LID BMPs 12

D.1 Infiltration Applicability 12
D.2 Harvest and Use Assessment 13
D.3 Bioretention and Biotreatment Assessment 15
D.4 Feasibility Assessment Summaries 16
D.5 LID BMP Sizing 17

Section E: Alternative Compliance (LID Waiver Program) 18

E.1 Identify Pollutants of Concern 19
E.2 Stormwater Credits 20
E.3 Sizing Criteria 20
E.4 Treatment Control BMP Selection 21

Section F: Hydromodification 22

F.1 Hydrologic Conditions of Concern (HCOC) Analysis 22
F.2 HCOC Mitigation 23

Section G: Source Control BMPs 24

Section H: Construction Plan Checklist 27

Section I: Operation, Maintenance and Funding 28

List of Tables

Table A.1 Identification of Receiving Waters 7
Table A.2 Other Applicable Permits 7
Table C.1 DMA Classifications 10
Table C.2 Type 'A', Self-Treating Areas 10
Table C.3 Type 'B', Self-Retaining Areas 10
Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas 11
Table C.5 Type 'D', Areas Draining to BMPs 11
Table D.1 Infiltration Feasibility 12
Table D.2 LID Prioritization Summary Matrix 16
Table D.3 DCV Calculations for LID BMPs 17
Table E.1 Potential Pollutants by Land Use Type 19
Table E.2 Water Quality Credits 20
Table E.3 Treatment Control BMP Sizing 20
Table E.4 Treatment Control BMP Selection 21
Table F.1 Hydrologic Conditions of Concern Summary 22
Table G.1 Permanent and Operational Source Control Measures 24
Table H.1 Construction Plan Cross-reference 27

List of Appendices

Appendix 1: Maps and Site Plans 29
Appendix 2: Construction Plans 31
Appendix 3: Soils Information 32
Appendix 4: Historical Site Conditions 33
Appendix 5: LID Infeasibility 34
Appendix 6: BMP Design Details 35
Appendix 7: Hydromodification 36
Appendix 8: Source Control 37
Appendix 9: O&M 38
Appendix 10: Educational Materials ..... - 6 -

Section A: Project and Site Information

PROJECT INFORMATION			
Type of Project:	Industrial		
Planning Area:	N/A		
Community Name:	N/A		
Development Name:	N/A		
PROJECT LOCATION			
Latitude & Longitude (DMS): 33.925064, -116.980018			
Project Watershed and Sub-Watershed: Santa Ana Watershed			
Gross Acres: 3.87 APN(s): 418-200-003, -004, -005 Map Book and Page No.: Assessor's Map Book 418 PG. 20			
PROJECT CHARACTERISTICS			
Proposed or Potential Land Use(s)	Industrial		
Proposed or Potential SIC Code(s)	2499		
Area of Impervious Project Footprint (SF)	168,200		
Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement	77,570		
Does the project consist of offsite road improvements?	☐ Y	☒ N	
Does the project propose to construct unpaved roads?	☐ Y	☒ N	
Is the project part of a larger common plan of development (phased project)?	☐ Y	☒ N	
EXISTING SITE CHARACTERISTICS			
Total area of existing Impervious Surfaces within the Project limits Footprint (SF)	0		
Is the project located within any MSHCP Criteria Cell?	☐ Y	☒ N	
If so, identify the Cell number:	N/A		
Are there any natural hydrologic features on the project site?	☐ Y	☒ N	
Is a Geotechnical Report attached?	☐ Y	☒ N	
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	C		
What is the Water Quality Design Storm Depth for the project?	0.85		

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling
- BMP Locations (Lat/Long)

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Jacinto River Reach 3	There are no 303(d) published impairments for the Whitewater River	N/A	N/A
Canyon Lake	There are no 303(d) published impairments for the Whitewater River	Water supply, groundwater recharge, recreation, warm water, habitat, wildlife	N/A
San Timoteo Creek Reach 2	N/A	MUN,GWR,REC1,REC2,WARM,WILD	N/A
San Jacinto River Reach 1	There are no 303(d) published impairments for the Whitewater River	N/A	N/A
Lake Elsinore	DDT, Nutrients, Organic Enrichment/Low Dissolved Oxygen	AQUA, IND, REC I, REC II, WARM, WILD & RARE	N/A

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☐ Y	☒ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)*	☐ Y	☒ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Consideration of "highest and best use" of the discharge should also be considered. For example, Lake Elsinore is evaporating faster than runoff from natural precipitation can recharge it. Requiring infiltration of 85% of runoff events for projects tributary to Lake Elsinore would only exacerbate current water quality problems associated with Pollutant concentration due to lake water evaporation. In cases where rainfall events have low potential to recharge Lake Elsinore (i.e. no hydraulic connection between groundwater to Lake Elsinore, or other factors), requiring infiltration of Urban Runoff from projects is counterproductive to the overall watershed goals. Project proponents, in these cases, would be allowed to discharge Urban Runoff, provided they used equally effective filtration-based BMPs.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

Yes, the site mimics the existing topography by draining north to south.

Did you identify and protect existing vegetation? If so, how? If not, why?

Yes, there is currently no vegetation on site and that will remain the same.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

Yes, compaction will be limited to non-landscape areas.

Did you identify and minimize impervious area? If so, how? If not, why?

No, the owner has decided to add additional hardscape storage area.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Yes, runoff will still be directed north to south over exposed soil allowing for infiltration along its course.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1][2]	Area (Sq. Ft.)	DMA Type
DMA A	Mixed Surface	168,200	D

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*
[2]*If multi-surface provide back-up*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
N/A	N/A	N/A	N/A

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
N/A	N/A	N/A	**N/A**	**N/A**	**N/A**	**N/A**
N/A	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
N/A	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet)	Post-project surface type	Impervious fraction	Product			
	[A]		[B]	[C] = [A] x [B]	DMA name /ID	[D]	[C]/[D]
N/A	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
N/A	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
N/A	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
N/A	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
DMA A	**Bio-Retention Basin**

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site; proceed to section D.3

If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	0	
If Yes, list affected DMAs:	DMA A	
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		X
Describe here:		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

☐ Reclaimed water will be used for the non-potable water demands for the project.

☐Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☒The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If none of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: 2.08 (Acres)

Type of Landscaping (Conservation Design or Active Turf): Conservation Design

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 1.78 (Acres)

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: 2.12

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: 3.78 (Acres)

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
3.8 8(Acres)	2.08 (Acres)

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: 4

Project Type: Industrial

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 2.08 (Acres)

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-2 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: 2.29

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: 5

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	Projected number of toilet users (Step 1)
5	4

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-4 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-4: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the projected average daily use (Step 1) to the minimum required non-potable use (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
N/A	N/A

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment per Section 3.4.2 of the WQMP Guidance Document.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA A	☐	☐	☒	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

According to the Geotechnical Report, the site contains clayey sand to sandy clay. The Hydrologic Soil Group for this soil is C. The report concludes a infiltration rate of 0 in/hr was obtained.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	**DMA Area (square feet)**	**Post-Project Surface Type**	**Effective Impervious Fraction, I_f**	**DMA Runoff Factor**	**DMA Areas x Runoff Factor**	***Enter BMP Name / Identifier Here***		
	[A]		[B]	[C]	[A] x [C]			
DMA A	*168,200*	*Mixed*	*0.461*	*0.32*	*53,001*	*Design Storm Depth (in)*	*Design Capture Volume,* **V_{BMP}** *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	A_T = 168,200				Σ= 53,001	0.85	[F] = 3,755	4,115

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

List DMAs here.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☒ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft^2)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft^2)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☐	☐	☐	☐	☐	☐	☐	☐

P = Potential

N = Not Potential

(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

(3) A potential Pollutant is land use involving animal waste

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	N/A
Total Credit Percentage[1]	

[1]Cannot Exceed 50%

[2]Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	**DMA Area (square feet)**	**Post-Project Surface Type**	**Effective Impervious Fraction, I_f**	**DMA Runoff Factor**	**DMA Area x Runoff Factor**		***Enter BMP Name / Identifier Here***		
	[A]		[B]	[C]	[A] x [C]				
N/A						*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	A_T = Σ[A]				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document

[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document

[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
Bio-Retention Basin	Bacteria, Nutrients, Pesticides, Sediments, Trash & Debris, and Oil & Grease	High

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.
[2] Cross Reference Table E.1 above to populate this column.
[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	N/A	N/A	N/A
Volume (Cubic Feet)	N/A	N/A	N/a

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Susceptibility Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

N/A

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

A bioretention basin is being proposed to mitigate for the added runoff and volume.

	2 year – 24 hour			
	Pre-condition	**Post-condition**	**Difference**	**Bioretention Basin Volume**
Volume (Cubic Feet)	11,609.0	17,187.3	5,578.3	5,878.05

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
Hardscape and Parking lot		Sweep/clean driveways and parking regularly and collect trash and debris to go into the refuse area.
Refuse Area	Refuse will be handled by receptacles with signs with the words "Do not dump hazardous materials here" or similar verbiage.	Inspect receptacles regularly and replace broken or damaged. Keep spill control materials available onsite.
Landscape/Outdoor Pesticide Use	Final landscape plans will accomplish all of the following:	Maintain landscaping using minimum or no pesticides.

	Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of firtilizers and pesticides that can contribute to stormwater pollution. Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. Consider using pest-resisitant plants, especially adjacent to hardscape. To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	Provide IPM information to new owners, lessees, and operators. See applicable operational BMPs in "What you should know for….landscaping and Garding: at http://reflood.org/stormwater/
Roofing, gutters, and trim; condensate drain lines	Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	

	Include controls for other sources as specified by local reviewer.	
Plazas, sidewalks, and parking lots.		Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect wash water containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	BMP Location (Lat/Long)
Bio-Retention Basin	Bio-Retention Basin for 202 E. Third Street	Preliminary Grading Plan sheet 2 of 3 WQMP Exhibit- Sheet 3 of 3	33.924918, -116.979947

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: The owner of the land will be responsible for the maintenance of the site and clearing of debris to allow for site infiltration.

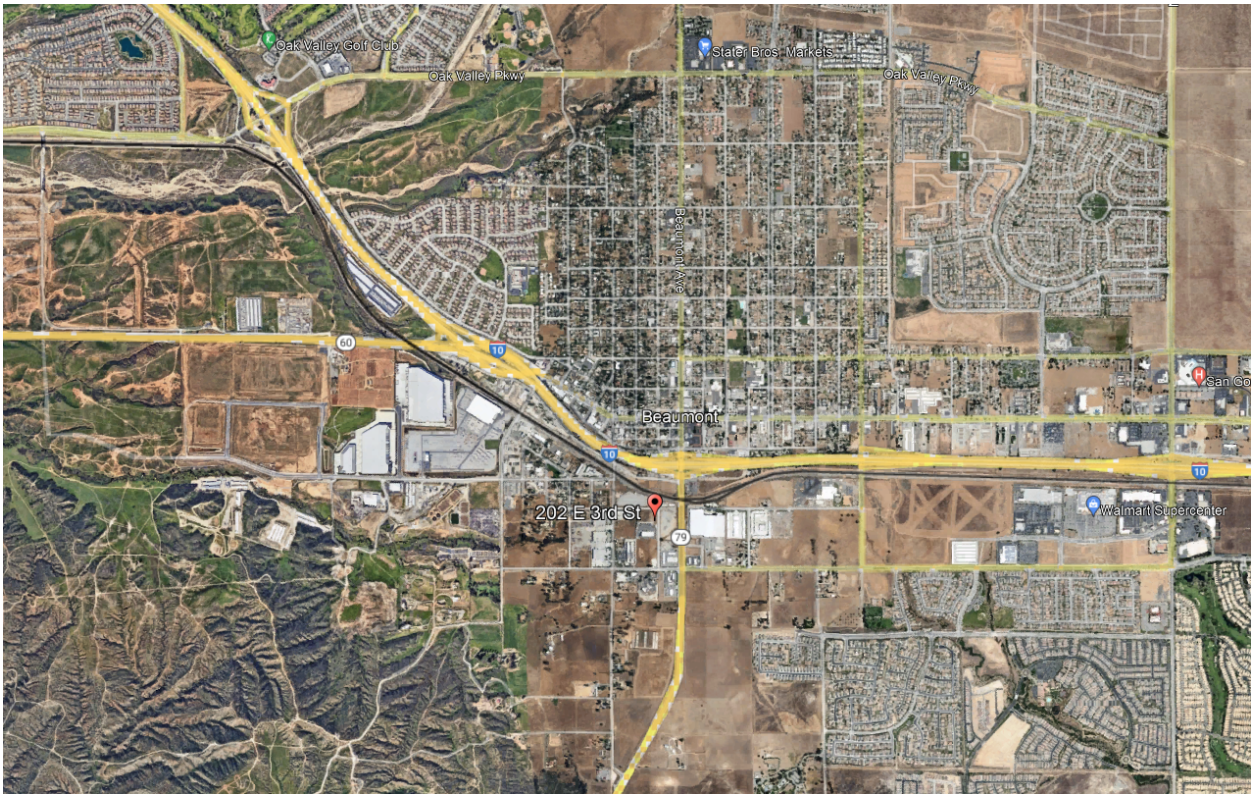
Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☐ Y ☒ N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map



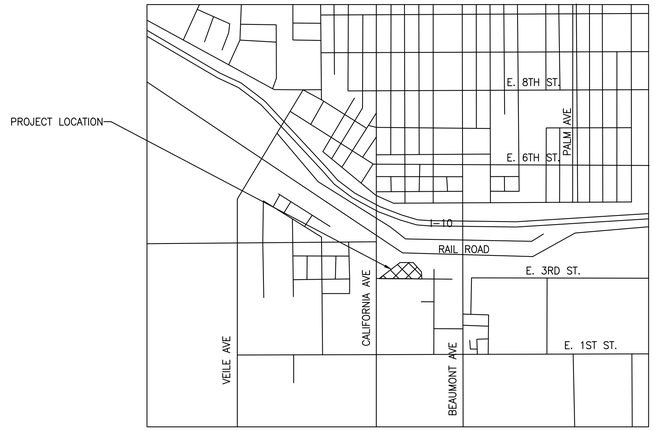
VICINITY MAP
N.T.S


Receiving Map
Legend
202 E 3rd St
Project Location
SAN TIMOTEO CREEK REACH 3
SAN JACINTO RIVER REACH 3
SAN JACINTO RIVER REACH 1
CANYON LAKE
LAKE ELSINORE
Moreno Valley
Beaumont
Banning
March Air Reserve Base
Woodcrest
Perris
San Jacinto
Hemet
Menifee
Lake Elsinore
Google Earth
10 mi
N

Appendix 2: Construction Plans

WQMP Exhibit

CITY OF BEAUMONT, CALIFORNIA
IMPROVEMENT PLANS FOR
202 E. THIRD STREET



VICINITY MAP

WORK TO BE DONE

THE IMPROVEMENT WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING DOCUMENTS, CURRENT AT THE TIME OF CONSTRUCTION, AS DIRECTED BY THE CITY ENGINEER.

1. BEAUMONT MUNICIPAL CODE.
2. FOR STREETS: RIVERSIDE COUNTY ORDINANCE NO. 461.
   FLOOD CONTROL FACILITIES: THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S STANDARDS FOR FLOOD CONTROL FACILITIES.
   SANITARY SEWER FACILITIES: THE EASTERN MUNICIPAL WATER DISTRICT'S STANDARDS FOR SANITARY SEWER FACILITIES.
   ALL OTHER PUBLIC WORKS: THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREEN BOOK).
3. THIS SET OF PLANS.

LEGEND

DESCRIPTION	DWG. NO.	SYMBOL	QUANTITY
RIGHT-OF-WAY, R/W			
DAYLIGHT LINE			
PROP CONTOUR			
EXISTING CONTOUR			
CENTERLINE, CL			

	CONSTRUCTION NOTES	QUANTITY	UNITS
①	CONSTRUCT BIO-RETENTION BASIN	1	EA
②	INSTALL 6" UNDER DRAIN PERFORATED PIPE	398	LF
③	INSTALL 3' WIDE CONCRETE VALLEY GUTTER PER DETAIL ON SHEET 2	203	LF
④	INSTALL 1' PVC OVERFLOW INLET	5	LF
⑤	PREVIOUSLY INSTALLED 4" ASPHALT OVER 4" A.B.	31,927	SF
⑥	INSTALL DROP INLET MODIFIED TO ACCEPT FLOW. SEE DETAIL ON SHEET 3.	1	EA
⑦	CONTRACTOR TO REMOVE EXISTING 24" CMP PIPE AND REPLACE WITH 48" HDPE PIPE	200	LF
⑧	INSTALL 36" CMP PIPE AND COLLAR TO JOIN EXISTING	2	LF
⑨	INSTALL 48" 45° BEND PIPE	1	EA
⑩	INSTALL 24" CMP PIPE AND COLLAR TO JOIN EXISTING	2	LF

ESTIMATED EARTHWORK QUANTITIES (PREVIOUS GRADING)

THE QUANTITIES BELOW ARE FOR PERMIT PURPOSES ONLY. CONTRACTOR SHALL PERFORM AND RELY ON THEIR OWN EARTHWORK CALCULATIONS AND BID ACCORDINGLY.

	CUT(CYDS)	FILL (CYDS)
ROUGH GRADING	0	0
ASPHALT AREAS	0	−395
UNDERCUT ASPHALT AREAS	+395	+395
SHRINKAGE (15%)	0	+60
TOTAL EARTHWORK	395	60
EXPORT MATERIAL		335 CUBIC YARDS

EARTHWORK QUANTITIES (NEW GRADING)

THE QUANTITIES BELOW ARE FOR PERMIT PURPOSES ONLY. CONTRACTOR SHALL PERFORM AND RELY ON THEIR OWN EARTHWORK CALCULATIONS AND BID ACCORDINGLY.

	CUT(CYDS)	FILL (CYDS)
ROUGH GRADING	9	232
CONCRETE AREAS	0	−304
BASIN	+410	+339
SHRINKAGE (15%)	0	+62
TOTAL EARTHWORK	419	329
EXPORT MATERIAL		90 CUBIC YARDS

PRIVATE ENGINEERS NOTICE TO CONTRACTOR(S)

1. THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT THOSE SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN, AND ANY OTHER LINES OR STRUCTURES NOT SHOWN ON THESE PLANS AND IS RESPONSIBLE FOR THE PROTECTION OF, AND ANY DAMAGE TO THESE LINES OR STRUCTURES
2. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO NOTIFY THE OWNER OF ALL UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.
3. QUANTITIES SHOWN HEREON ARE PROVIDED FOR BIDDING PURPOSES ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL QUANTITIES PRIOR TO BIDDING FOR CONSTRUCTION.
4. THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

INDEX OF SHEETS

SHEET 1 – TITLE SHEET
SHEET 2 – GENERAL NOTES
SHEET 3 – PRELIMINARY GRADING PLAN
SHEET 4 – WQMP EXHIBIT

"DECLARATION OF RESPONSIBLE CHARGE"

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS. I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF BEAUMONT DOES NOT RELIEVE ME AS ENGINEER OF WORK OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

FIRM: BLUE ENGINEERING & CONSULTING, INC.
ADDRESS: 9320 BASELINE RD., STE. D
CITY, ST.: RANCHO CUCAMONGA, CA 91701
TELEPHONE: (909) 970-5654
BY: ANGEL CESAR, P.E. RCE: 87222 (NAME OF ENGINEER & RCE) DATE: 11 / 08 / 2022

NOTE

1. APPROVAL OF THESE PLANS APPLIES ONLY WITHIN THE JURISDICTION OF THE CITY OF BEAUMONT.
2. TRENCHING FOR UTILITIES AND STRUCTURES IS NOT ALLOWED UNTIL SOIL COMPACTION REPORT IS SUBMITTED AND APPROVED BY THE PUBLIC WORKS DEPARTMENT.
3. THE CITY RESERVES THE RIGHT TO REQUIRE REVISION OF THE APPROVED PLANS TO CONFORM WITH CURRENT STANDARDS AND TO POST A NEW BOND IF CONSTRUCTION HAS NOT COMMENCED WITHIN TWO YEARS AFTER PLANS WERE APPROVED.
4. SIDEWALK AND DRIVEWAY APPROACHES WILL BE POURED/CONSTRUCTED ONLY AFTER DRIVEWAY LOCATIONS ARE DETERMINED.

LEGAL DESCRIPTION:

418-200-003
1.97 ACRES M/L IN POR LOTS 9, 11, 12 & 13 BLK 132 MB 006/016 SB AMENDED MAP OF THE TOWN OF BEAUMONT FOR TOTAL DESCRIPTION SEE ASSESSORS MAPS Lot 9 Block 132
418-200-004
1.65 ACRES M/L IN LOTS 8, 9, 11 & 12 BLK 131 MB 006/016 SB AMENDED MAP OF THE TOWN OF BEAUMONT Lot 8 Block 131
418-200-005
POR LOT 10 BLK 131 MB 006/016 SB AMENDED MAP OF THE TOWN OF BEAUMONT Lot 10 Block 131 SubdivisionName AMENDED MAP OF THE TOWN OF BEAUMONT

OWNER/APPLICANT:

PREMIUM LAND DEVELOPMENT, LLC
35109 AVENUE C
YUCAIPA, CA 92399
909-283-8588

SITE ADDRESS:

202 E. THIRD STREET
BEAUMONT, CA 92223

SOURCE OF TOPOGRAPHY

TMR ASSOCIATES
155 W. HOSPITALITY LN. STE. 122
SAN BERNARDINO, CA 92408
909-890-3730
DATE SURVEYED: 03-23-22

ASSESSOR'S PARCEL NO.

418-200-003, -004, -005

ALL STANDARD DRAWINGS ARE COUNTY OF RIVERSIDE ROAD IMPROVEMENT STANDARDS & SPECIFICATIONS UNLESS NOTED OTHERWISE:
* RCFC&WCD STANDARD MANUAL
** EMWD SEWER STANDARD DRAWINGS
*** STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PW#2022-0085

DIGALERT — Call 2 Working Days Before You Dig! 811

BENCHMARK:
IN BEAUMONT,AT THE JUNCTION OF CALIFORNIA AVENUE AND FIFTH PLACE, 28.9 M (94.8FT) WEST OF THE AVENUE CENTERLINE, 7.7 M (25.3 FT) SOUTH OF THE CENTERLINE OF FIFTH PLACE, 1.1 M (3.6 FT) NORTH OF A GUY WIRE, 0.79 M (2.6 FT) SOUTH OF A POWER POLE, 0.18 M (0.6 FT) EAST OF A WITNESS POST.
THE MARK IS 0.6 METERS W FROM A SECOND WITNESS POST. THE MARK IS ABOVE LEVEL WITH THE AVENUE.
ELEV. 2576.61, NGVD 29

BY	MARK	DESCRIPTION	APPR.	DATE
	1			

ENGINEER — REVISIONS — CITY

SEAL
BLUE Engineering & Consulting, Inc
9320 BASELINE RD., STE. D – RANCHO CUCAMONGA, CA 91701
INFO@BLUECIVILENG.COM – WWW.BLUECIVILENG.COM
909-248-6557
ANGEL CESAR, P.E. R.C.E. 87222 EXP. 09/30/23
11 / 08 / 2022 DATE

REGISTERED PROFESSIONAL ENGINEER — ANGEL CESAR — No. 87222 — CIVIL — STATE OF CALIFORNIA

DESIGN BY:
DRAWN BY:
CHECKED BY:
SCALE:
DATE:
JOB NUMBER:

BEAUMONT — CALIFORNIA
PUBLIC WORKS DEPARTMENT
550 E. 6TH ST, BEAUMONT, CA 92223

Reviewed By: _____ Date: _____ STAFF ENGINEER
Recommended for Approval By: _____ Date: 11/09/2022 PRINCIPAL ENGINEER
Approved By: _____ Date: 11/09/2022 CITY ENGINEER

CITY OF BEAUMONT, PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
550E. 6th St Beaumont, CA 92223
TEL: (951) 769-8520 FAX: (951) 769-8526

CITY OF BEAUMONT, CALIFORNIA
GRADING PLANS FOR:
202 E. THIRD STREET
APN. 418-200-003, -004, -005

TITLE SHEET

SHEET 1 OF 4 SHEETS
FILE NO: 3449

GENERAL NOTES

1. THIS PLAN SUPERSEDES ALL OTHER PLANS PREVIOUSLY APPROVED BY THE CITY OF BEAUMONT REGARDING IMPROVEMENTS SHOWN ON THIS SET OF PLANS.
2. APPROVAL OF THIS PLAN DOES NOT LESSEN OR WAIVE ANY PORTION OF THE BEAUMONT MUNICIPAL CODE, RESOLUTION OF CONDITIONAL APPROVAL, CITY STANDARDS OR OTHER ADDITIONAL DOCUMENTS LISTED HEREIN AS THEY MAY PERTAIN TO THIS PROJECT. THE ENGINEER IN RESPONSIBLE CHARGE SHALL REVISE THESE PLANS WHEN NON-CONFORMANCE IS DISCOVERED.
3. CITY APPROVAL OF PLANS DOES NOT RELIEVE THE DEVELOPER OR ENGINEER-OF-WORK FROM RESPONSIBILITY FOR THE CORRECTION OF ERRORS AND OMISSIONS DISCOVERED DURING CONSTRUCTION. ALL PLAN REVISIONS SHALL BE PROMPTLY SUBMITTED TO THE CITY ENGINEER FOR APPROVAL.
4. A RIGHT-OF-WAY PERMIT FROM THE BUILDING & SAFETY DEPARTMENT WILL BE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT OF WAY. PRIOR TO PERMIT ISSUANCE, A CERTIFICATE OF INSURANCE MUST BE FILED NAMING THE CITY OF BEAUMONT AS AN ADDITIONAL INSURED ON THE PERMITTEE'S POLICY IN THE MINIMUM AMOUNT OF $1,000,000.00 FOR EACH OCCURRENCE OF LIABILITY. THE INSURANCE COMPANY WRITING THE POLICY MUST HAVE A RATING OF "A-" OR BETTER AND A SIZE CATEGORY OF CLASS VII OR BETTER AS ESTABLISHED BY "BESTS" KEY RATING GUIDE.
5. NO WORK SHALL BE COMMENCED UNTIL ALL PERMITS HAVE BEEN OBTAINED FROM THE CITY AND OTHER APPROPRIATE AGENCIES.
6. REVISION OF THESE PLANS MAY BE REQUIRED IF THE PROPOSED IMPROVEMENTS ARE NOT CONSTRUCTED PRIOR TO THE DEADLINE DATE OF THE IMPROVEMENT AGREEMENT.
7. NO REVISIONS WILL BE MADE TO THESE PLANS WITHOUT THE WRITTEN APPROVAL OF THE CITY ENGINEER, NOTED WITHIN THE REVISION BLOCK, ON THE APPROPRIATE SHEET OF THE PLANS AND TITLE SHEET.
8. ORIGINAL DRAWINGS SHALL BECOME THE PROPERTY OF THE CITY UPON BEING SIGNED BY THE CITY ENGINEER.
9. THE ORIGINAL DRAWING SHALL BE REVISED TO REFLECT AS-BUILT CONDITIONS BY THE ENGINEER-OF-WORK PRIOR TO FINAL ACCEPTANCE OF THE WORK BY THE CITY.
10. ACCESS FOR FIRE AND OTHER EMERGENCY VEHICLES SHALL BE MAINTAINED TO THE PROJECT SITE AT ALL TIMES DURING CONSTRUCTION.
11. WHERE TRENCHES ARE WITHIN CITY EASEMENTS, A SOILS REPORT COMPRISED OF:
    A. SUMMARY SHEET
    B. LABORATORY WORK SHEETS
    C. COMPACTION CURVES, SHALL BE SUBMITTED BY A PROFESSIONAL ENGINEER OF THE STATE OF CALIFORNIA, PRINCIPALLY DOING BUSINESS IN THE FIELD OF APPLIED SOILS MECHANICS. THE SOILS REPORT WILL BE SUBMITTED TO THE CITY ENGINEERING INSPECTOR WITHIN TWO WORKING DAYS OF COMPLETION OF FIELD TESTS. THE WRITTEN FIELD COMPACTION REPORT(S) SHALL BE IMMEDIATELY SUBMITTED TO THE CITY ENGINEERING INSPECTOR UPON COMPLETION OF THE FIELD TESTS.
12. A PRECONSTRUCTION MEETING SHALL BE HELD AT THE SITE PRIOR TO THE BEGINNING OF WORK AND SHALL BE ATTENDED BY ALL REPRESENTATIVES RESPONSIBLE FOR CONSTRUCTION, INSPECTION, SUPERVISION, TESTING AND ALL OTHER ASPECTS OF THE WORK. THE CONTRACTOR SHALL SCHEDULE THE MEETING BY CALLING THE INSPECTION LINE AT (951) 572-3224 AT LEAST FIVE (5) WORKING DAYS PRIOR TO STARTING CONSTRUCTION. APPROVED DRAWINGS MUST BE AVAILABLE PRIOR TO SCHEDULING.
13. ALL INSPECTION REQUESTS OTHER THAN FOR THE PRECONSTRUCTION MEETING WILL BE MADE BY CALLING THE BUILDING AND SAFETY INSPECTION REQUEST LINE AT (951) 572-3224. INSPECTION REQUESTS MUST BE RECEIVED PRIOR TO 2:00 P.M. ON THE DAY BEFORE THE INSPECTION IS NEEDED. INSPECTIONS WILL BE MADE THE NEXT WORK DAY UNLESS YOU REQUEST OTHERWISE. REQUESTS MADE AFTER 2:00 P.M. WILL BE SCHEDULED FOR TWO FULL WORK DAYS LATER.
14. THE OWNER AND/OR APPLICANT THROUGH THE DEVELOPER AND/OR CONTRACTOR SHALL DESIGN, CONSTRUCT AND MAINTAIN ALL SAFETY DEVICES, INCLUDING SHORING, AND SHALL BE SOLELY RESPONSIBLE FOR CONFORMING TO ALL LOCAL, STATE AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS AND REGULATIONS.
15. THE CONTRACTOR SHALL CONFORM TO LABOR CODE SECTION 6705 BY SUBMITTING A DETAIL PLAN TO THE CITY ENGINEER AND/OR CONCERNED AGENCY SHOWING THE DESIGN OF SHORING, BRACING SLOPE OR OTHER PROVISIONS TO BE MADE OF WORKER PROTECTION FROM THE HAZARD OF CAVING GROUND DURING THE EXCAVATION OF SUCH TRENCH OR TRENCHES OR DURING THE PIPE INSTALLATION THEREIN. THIS PLAN MUST BE PREPARED FOR ALL TRENCHES FIVE FEET (5') OR MORE IN DEPTH AND APPROVED BY THE CITY ENGINEER AND/OR CONCERNED AGENCY PRIOR TO EXCAVATION. IF THE PLAN VARIES FROM THE SHORING SYSTEM STANDARDS ESTABLISHED BY THE CONSTRUCTION SAFETY ORDERS, TITLE 8 CALIFORNIA ADMINISTRATIVE CODE, THE PLAN SHALL BE PREPARED BY A REGISTERED ENGINEER AT THE CONTRACTORS EXPENSE. A COPY OF THE OSHA EXCAVATION PERMIT MUST BE SUBMITTED TO THE INSPECTOR PRIOR TO EXCAVATION.
16. IF ANY ARCHAEOLOGICAL RESOURCES ARE DISCOVERED WITHIN ANY WORK ZONE DURING CONSTRUCTION, OPERATIONS WILL CEASE IMMEDIATELY, AND THE PERMITTEE WILL NOTIFY THE CITY ENGINEER. OPERATIONS WILL NOT RESTART UNTIL THE PERMITTEE HAS RECEIVED WRITTEN AUTHORITY FROM THE CITY ENGINEER TO DO SO.
17. ALL OPERATIONS CONDUCTED ON THE SITE OR ADJACENT THERETO SHALL ADHERE TO THE NOISE ORDINANCE SET FORTH BY THE CITY MUNICIPAL CODE. ALL OPERATIONS SHALL BE LIMITED BY THE NOISE ORDINANCE TO THE LEVEL OF DECIBELS SPECIFIED FOR THE AREA AND TIME PERIOD. CONSTRUCTION ACTIVITIES WILL BE LIMITED TO THE PERIOD BETWEEN 7:00 A.M. AND 6:00 P.M. EACH DAY MONDAY THROUGH FRIDAY, UNLESS OTHERWISE PERMITTED.
18. ALL OFF-SITE HAUL ROUTES SHALL BE SUBMITTED BY THE CONTRACTOR TO THE CITY ENGINEER FOR APPROVAL TWO FULL WORKING DAYS PRIOR TO BEGINNING OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DEBRIS OR DAMAGE OCCURRING ALONG THE HAUL ROUTE OR ADJACENT STREETS AS A RESULT OF THE GRADING OPERATION.
19. NO BLASTING SHALL BE COMMENCED WITHOUT A CITY ENGINEER APPROVED BLASTING PROGRAM AND BLASTING PERMIT.
20. THE EXISTENCE AND LOCATION OF UTILITY STRUCTURES AND FACILITIES SHOWN ON THE CONSTRUCTION PLANS WERE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. ATTENTION IS CALLED TO THE POSSIBLE EXISTENCE OF OTHER UTILITY FACILITIES OR STRUCTURES NOT SHOWN OR IN A LOCATION DIFFERENT FROM THAT SHOWN ON THE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN ON THE PLANS AND ANY OTHER EXISTING FACILITIES OR STRUCTURES NOT SHOWN.
21. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING FACILITIES (ABOVEGROUND AND UNDERGROUND) WITHIN THE PROJECT SITE SUFFICIENTLY AHEAD OF THE CONSTRUCTION TO PERMIT THE REVISIONS OF THE CONSTRUCTION PLANS IF IT IS FOUND THAT THE ACTUAL LOCATIONS ARE IN CONFLICT WITH THE PROPOSED WORK.
22. THE CONTRACTOR SHALL NOTIFY AFFECTED UTILITY COMPANIES (SEE BELOW) AT LEAST TWO FULL WORKING DAYS PRIOR TO STARTING CONSTRUCTION NEAR THEIR FACILITIES AND SHALL COORDINATE WORK WITH A COMPANY REPRESENTATIVE.

UNDERGROUND SERVICE ALERT	(800) 422-4133
SOUTHERN CALIFORNIA EDISON	(800) 409-2365
AT&T	(800) 892-0123
TIME WARNER CABLE	(760) 340-2225
COX COMMUNICATIONS	(888) 423-3913

23. IN ACCORDANCE THE CITY STORM WATER STANDARDS ALL STORM DRAIN INLETS CONSTRUCTED BY THIS PLAN SHALL INCLUDE "STENCILS" BE ADDED TO PROHIBIT WASTE DISCHARGE DOWNSTREAM. STENCILS SHALL BE ADDED TO THE SATISFACTION OF THE CITY ENGINEER.

GRADING NOTES

1. ALL GRADING SHALL CONFORM TO THE CITY OF BEAUMONT ORDINANCES, CURRENT ADOPTED CALIFORNIA BUILDING CODE, APPENDIX J, STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, "LATEST EDITION" AND RECOMMENDATIONS OF THE SOILS ENGINEER.
2. NO WORK SHALL COMMENCED UNTIL ALL PERMITS HAVE BEEN OBTAINED FROM THE CITY AND OTHER APPROPRIATE AGENCIES.
3. ALL PROPERTY CORNERS SHALL BE CLEARLY DELINEATED IN THE FIELD PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION /GRADING.
4. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE AND EROSION CONTROL SHOULD BE PROVIDED TO PREVENT PONDING WATER, SEDIMENT TRANSPORTATION, AND DAMAGE TO ADJACENT PROPERTIES.
5. DUST SHALL BE CONTROLLED BY WATERING OR OTHER APPROVED METHODS.
6. NO FILL SHALL BE PLACED ON EXITING GROUND THAT HAS NOT BEEN CLEARED OF WEEDS. DEBRIS, TOPSOIL AND OTHER DELETERIOUS MATERIAL.
7. MAXIMUM CUT AND FILL SLOPE = 2: 1 EXCEPT WHERE SPECIFICALLY APPROVED OTHERWISE.
8. PROVIDE A 5' WIDE BY 1' HIGH BERM OR EQUIVALENT ALONG THE TOP OF ALL FILL SLOPES OVER 5' HIGH.
9. PROVIDE A BROW DITCH DESIGNED TO HANDLE 100 YR STORM FLOWS ALONG THE TOP OF CUT SLOPES.
10. NO OBSTRUCTION OF FLOODPLAIN OR NATURAL WATER COURSES SHALL BE PERMITTED.
11. ALL EXISTING DRAINAGE COURSES ON THE PROJECT SITE SHALL CONTINUE TO FUNCTION, ESPECIALLY DURING STORM CONDITIONS, PROTECTIVE MEASURES AND TEMPORARY DRAINAGE PROVISIONS MUST BE USED TO PROTECT ADJOINING PROPERTIES DURING GRADING OPERATIONS.
12. CUT AND FILL SLOPES EQUAL TO OR GREATER THAN 3' IN VERTICAL HEIGHT SHALL BE PLANTED WITH GRASS OR GROUND COVER TO PROTECT THE SLOPE FROM EROSION AND INSTABILITY IN ACCORDANCE WITH CITY OF BEAUMONT REQUIREMENTS PRIOR TO FINAL GRADING INSPECTION
13. ALL SLOPES REQUIRED TO BE PLANTED SHALL BE PLANTED WITH APPROVED GROUND COVER AT 12" ON CENTER. SLOPES EXCEEDING 15' IN VERTICAL HEIGHT SHALL BE PLANTED WITH APPROVED TREES SPACED NOT TO EXCEED 20' ON CENTER OR SHRUBS NOT TO EXCEED 10' OR A COMBINATION OF SHRUBS AND TREES NOT TO EXCEED 15' IN ADDITION TO A GRASS MIX GROUND COVER. SLOPES EQUAL TO OR GREATER THAN 4' IN VERTICAL HEIGHT SHALL BE PROVIDED WITH AN IN-GROUND IRRIGATION SYSTEM COMPLETE WITH AN APPROPRIATE BACKFLOW PREVENTION DEVICE PER CITY REQUIREMENTS.
14. IF STEEP SLOPING TERRAIN OCCURS UPON WHICH FILL IS TO BE PLACED. IT MUST BE CLEARED, KEYED, AND BENCHED INTO FIRM NATURAL SOIL FOR FULL SUPPORT. PREPARATION SHALL BE APPROVED BY A SUITABLY QUALIFIED AND REGISTERED GEOTECHNICAL ENGINEER OR GEOLOGIST PRIOR TO PLACEMENT OF FILL MATERIAL.
15. THE GROUND IMMEDIATELY ADJACENT TO A FOUNDATION SHALL BE SLOPED AWAY FROM THE BUILDING AT A SLOPE OF NOT LESS THAN ONE UNIT VERTICAL IN 20 UNITS HORIZONTAL (5-PERCENT SLOPE) FOR A MINIMUM DISTANCE OF 10 FEET MEASURED PERPENDICULAR TO THE FACE OF THE WALL. IF PHYSICAL OBSTRUCTIONS OR LOT LINES PROHIBIT 10 FEET (3048 MM) OF HORIZONTAL DISTANCE, A 5-PERCENT SLOPE SHALL BE PROVIDED TO AN APPROVED ALTERNATIVE METHOD OF DIVERTING WATER AWAY FROM THE FOUNDATION. SWALES USED FOR THIS PURPOSE SHALL BE SLOPED A MINIMUM OF 2 PERCENT WHERE LOCATED WITHIN 10 FEET OF THE BUILDING FOUNDATION. IMPERVIOUS SURFACES WITHIN 10 FEET OF THE BUILDING FOUNDATION SHALL BE SLOPED A MINIMUM OF 2 PERCENT AWAY FROM THE BUILDING.
16. ALL GRADING SHALL BE CONTINUOUSLY OBSERVED BY A COMPETENT SOILS ENGINEER WHO SHALL VERIFY THAT ALL FILL HAS BEEN PROPERLY PLACED AND WHO SHALL SUBMIT A FINAL COMPACTION REPORT FOR ALL FILLS OVER 1' DEEP.
17. A FINAL GEOTECHNICAL REPORT OF COMPLETION OF THE ROUGH GRADING, STATING SUBSTANTIAL CONFORMANCE WITH THE APPROVED GRADING PLAN, SHALL BE SUBMITTED TO THE BUILDING AND SAFETY DEPARTMENT PRIOR TO REQUESTING INSPECTION AND ISSUANCE OF BUILDING PERMITS. CERTIFICATIONS SHALL INCLUDE LINE GRADES, ELEVATIONS, AND LOCATION OF CUT/FILL SLOPES.
18. A LAND SURVEYOR OR ENGINEER AUTHORIZED TO PRACTICE LAND SURVEYING SHALL SUBMIT A PAD CERTIFICATION FOR ALL PADS. THE ELEVATION WITH RESPECT TO MEAN SEA LEVEL SHALL BE GIVEN. IF AN ELEVATION WITH RESPECT TO ADJACENT GROUND SURFACE IS REQUIRED, THE ACTUAL DISTANCE ABOVE THE ADJACENT GROUND SHALL BE GIVEN.
19. A GEOTECHNICAL ENGINEER OR GEOLOGIST SHALL SUBMIT TO THE BUILDING AND SAFETY DEPARTMENT AND THE PUBLIC WORKS DEPARTMENT A FINAL GEOTECHNICAL REPORT OF COMPLETION OF FINAL GRADING STATING SUBSTANTIAL CONFORMANCE WITH THE APPROVED PLANS FOR ALL GRADING DESIGNATED AS "ENGINEERED GRADING".
20. THE CONTRACTOR SHALL NOTIFY THE PUBLIC WORKS DEPARTMENT AT LEAST 24 HOURS IN ADVANCE REQUESTING FINISH LOT GRADE AND DRAINAGE INSPECTION. THIS INSPECTION MUST BE APPROVED PRIOR TO BUILDING PERMIT FINAL INSPECTION FOR EACH LOT.
21. ALL STORM DRAINS, CATCH BASINS, AND STORM WATER RUNOFF STRUCTURES WILL BE PROVIDED WITH ADEQUATE CAPABILITIES TO FILTER AND RETAIN SEDIMENT, GRIT, OIL, AND GREASE TO PREVENT POLLUTION IN STORM WATER RUNOFF IN COMPLIANCE WITH THE CITY OF BEAUMONT'S BEST MANAGEMENT PRACTICES AND BEAUMONT'S DRAINAGE MASTER PLAN FOR STORMWATER AS WELL AS BEST MANAGEMENT PRACTICES IDENTIFIED IN THE CURRENT REPORT OF WASTE DISCHARGE FOR RIVERSIDE COUNTY PERMITTEES.
22. CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT TWO DAYS BEFORE DIGGING AT 8-1-1 AND THE FOLLOWING UTILITY OR AGENCIES A MINIMUM OF TWO WORKING DAYS PRIOR TO COMMENCING ANY CONSTRUCTION OR GRADING:

a. CITY OF BEAUMONT	951.769.8520
b. VERIZON	800.880.1077
c. SOUTHERN CALIFORNIA GAS COMPANY	800.427.2200
d. BEAUMONT CHERRY VALLEY WATER DISTRICT	951.845.9581
e. EDISON	800.409.2365

23. TRENCHING FOR UTILITIES AND STRUCTURES IS NOT ALLOWED UNTIL A SOIL COMPACTION REPORT IS SUBMITTED TO AND APPROVED BY THE PUBLIC WORKS DEPARTMENT.
24. THE CONTRACTOR SHALL MAINTAIN ADJACENT STREETS IN A NEAT, SAFE, CLEAN AND SANITARY CONDITION AT ALL TIMES AND TO THE SATISFACTION OF THE CITY'S INSPECTOR. THE ADJACENT STREETS SHALL BE KEPT CLEAN OF SEDIMENT, DEBRIS AND OTHER NUISANCES AT ALL TIMES. THE DEVELOPER SHALL BE RESPONSIBLE FOR ANY CLEAN UP ON ADJACENT STREETS AFFECTED BY THE CONSTRUCTION.
25. ALL OPERATIONS CONDUCTED ON THE SITE OR ADJACENT THERETO SHALL ADHERE TO THE NOISE ORDINANCE SET FORTH BY THE CITY MUNICIPAL CODE. ALL OPERATIONS SHALL BE LIMITED BY THE NOISE ORDINANCE TO THE LIMIT OF DECIBELS SPECIFIED FOR THE AREA AND TIME PERIOD. CONSTRUCTION ACTIVITIES WILL BE LIMITED TO THE PERIOD BETWEEN 7:00 A.M. AND 6:00 P.M. MONDAY THROUGH FRIDAY.
26. ALL OFF-SITE HAUL ROUTES SHALL BE SUBMITTED BY THE CONTRACTOR TO THE CITY ENGINEER FOR APPROVAL TWO FULL WORKING DAYS PRIOR TO BEGINNING OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DEBRIS OR DAMAGE OCCURRING ALONG THE HAUL ROUTE OR ADJACENT STREETS AS A RESULT OF THE GRADING OPERATION.

STORM DRAIN NOTES

1. CONTRACTOR SHALL CONSTRUCT THE DRAINAGE IMPROVEMENT SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT DESIGN MANUAL STANDARD DRAWINGS, RECENT EDITION, THE SSPWC 'LATEST EDITION', AND IN CONFORMANCE WITH THE REQUIREMENTS OF THE BEAUMONT DRAINAGE MANAGEMENT PLAN.
2. CONTRACTOR SHALL COMPLY WITH THE STATE AND LOCAL SAFETY CODES DURING THE PROGRESS OF WORK.
3. CONSTRUCTION PROJECTS THAT DISTURB MORE THAN ONE ACRE MUST OBTAIN A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT. OWNER/DEVELOPERS ARE REQUIRED TO FILE A NOTICE OF INTENT (NOI) WITH THE STATE WATER RESOURCES CONTROL BOARD (SWRCB) AND COMPLY WITH ALL REQUIREMENTS OF THE BEAUMONT DRAINAGE MANAGEMENT PLAN. BEAUMONT IS CO-PERMITTEE WITH R.CF.C. & W.C.D.
4. ALL STORM DRAINS, CATCH BASINS, AND STORM WATER RUNOFF STRUCTURES WILL BE PROVIDED WITH ADEQUATE CAPABILITIES TO FILTER AND RETAIN SEDIMENT AND DIRT, OIL AND GREASE, TO PREVENT POLLUTION IN STORM WATER RUNOFF IN COMPLIANCE WITH THE CITY OF BEAUMONT'S BEST MANAGEMENT PRACTICES AND THE BEAUMONT DRAINAGE MASTER PLAN FOR STORM WATER AS WELL AS BEST MANAGEMENT PRACTICES IDENTIFIED IN THE CURRENT REPORT OF WASTE DISCHARGE FOR RIVERSIDE COUNTY PERMITTEES.
5. CONTRACTOR SHALL MAINTAIN ADJACENT STREETS IN A NEAT, SAFE, CLEAN AND SANITARY CONDITION AT ALL TIMES AND TO THE SATISFACTION OF THE COUNTY'S OR DISTRICT'S INSPECTOR. THE ADJACENT STREETS SHALL BE KEPT CLEAN OF DEBRIS, WITH DUST AND OTHER NUISANCE BEING CONTROLLED AT ALL TIMES. THE DEVELOPER SHALL BE RESPONSIBLE FOR ANY CLEAN UP ON ADJACENT STREETS AFFECTED BY HIS CONSTRUCTION. METHOD OF STREET CLEANING SHALL BE DRY SWEEPING OF ALL PAVED AREAS.
6. CONTRACTOR SHALL BE THE RESPONSIBILITY TO INSTALL AND MAINTAIN DURING CONSTRUCTION, REGULATORY GUIDE AND WARNING SIGNS WITHIN THE PROJECT LIMITS AND ITS SURROUNDINGS TO PROVIDE SAFE PASSAGE FOR THE TRAVELING PUBLIC AND WORKERS UNTIL THE FINAL COMPLETION AND ACCEPTANCE OF THE PROJECT BY THE CITY OF BEAUMONT.
7. CONTRACTOR AGREES THAT HE/SHE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE OWNER, CITY OF BEAUMONT, AND THE DEVELOPER'S ENGINEER, HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNERS OR THE DEVELOPER'S ENGINEER.
8. CONTRACTOR SHALL BE THE RESPONSIBLE TO OBTAIN AN ENCROACHMENT PERMIT FOR ALL WORK PERFORMED WITHIN PUBLIC RIGHT-OF-WAY, DEDICATED AND ACCEPTED FOR PUBLIC USE; AND TO BE RESPONSIBLE FOR SATISFACTORY COMPLIANCE FOR ALL CURRENT ENVIRONMENTAL REGULATIONS DURING THE LIFE OF CONSTRUCTION ACTIVITIES FOR THIS PROJECT.
9. CONTRACTOR MUST NOTIFY THE CITY OF BEAUMONT AT (951) 769-8520 AT LEAST ONE WEEK PRIOR TO CONSTRUCTION.
10. CONTRACTOR MUST PROVIDE CONSTRUCTION SCHEDULE TO THE CITY OF BEAUMONT AT LEAST 48 HOURS PRIOR TO BEGINNING CONSTRUCTION.
11. CONTRACTOR MUST CALL UNDERGROUND SERVICE ALERT AT 811 AT LEAST 48 HOURS BEFORE EXCAVATION.
12. CONTRACTOR IS REQUIRED TO CONTACT ALL UTILITY AGENCIES REGARDING TEMPORARY SUPPORT AND SHORING REQUIREMENTS FOR THE VARIOUS UTILITIES SHOWN IN THE PLANS.
13. THE CONTRACTOR SHALL VERIFY, BY POT HOLING, THE LOCATION OF POTENTIALLY AFFECTED UTILITIES.
14. CONTRACTOR SHALL HAVE GEOTECHNICAL/SOILS ENGINEERING FIRM OBSERVE TRENCHING, BACKFILLING, & SOIL COMPACTION OF ALL UTILITY TRENCHES WITHIN ALL EASEMENTS & ROAD RIGHTS OF WAY. TWO SETS OF COMPACTION REPORTS CERTIFYING THAT WORKS WERE DONE IN CONFORMANCE TO STANDARDS & GEOTECHNICAL REPORT SHALL BE SUBMITTED AFTER EACH UTILITY TRENCH IS COMPLETED & CERTIFIED. COMPACTION REPORT MUST BE SUBMITTED TO THE DEPT. OF PUBLIC WORKS AT LEAST TWO WORKING DAYS BEFORE AGGREGATE BASE MATERIALS ARE PLACED ONSITE.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEARING OF THE PROPOSED WORK AREA AND RELOCATION COSTS OF ALL EXISTING UTILITIES.
16. ELEVATIONS AND LOCATIONS OF UTILITIES SHOWN ARE APPROXIMATE UNLESS OTHERWISE NOTED. ALL UTILITIES SHOWN ARE TO BE PROTECTED IN PLACE UNLESS OTHERWISE NOTED.
17. ALL ELEVATIONS SHOWN ARE TO THE INVERTS OF PIPE, EXCEPT WHERE OTHERWISE NOTED.
18. STORM DRAIN PROFILES CONTAIN CALL--OUTS AND REFERENCE TO INTERSECTING STORM DRAIN LINES. INTERSECTIONS OF THESE JUNCTIONS ARE PROVIDED FOR REFERENCE ONLY. CONTRACTOR IS TO OBTAIN INVERT ELEVATIONS FROM THE RESPECTIVE PROFILE OF THE INTERSECTING PIPE.
19. ALL STATIONING REFERS TO THE CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
20. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE--CENTERLINE--INTERSECTION STATION.
21. ALL PIPE LENGTHS ARE HORIZONTAL PROJECTIONS (NOT TRUE LENGTHS OF PIPE) AND ARE THE BASIS OF THE ESTIMATES OF QUANTITIES. THE CONTRACTOR SHALL DETERMINE THE TRUE QUANTITY OF PIPE REQUIRED FOR THIS PROJECT PRIOR TO PLACING THE ORDER.
22. ALL CROSS SECTIONS ARE TAKEN LOOKING UPSTREAM.
23. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6 INCHES OF CLASS "B" CONCRETE.
24. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
25. PIPE BEDDING SHALL CONFORM TO R.C.F.C. & W.C.D. STD. DWG. M 815
26. "v" IS THE DEPTH OF INLET AT THE CATCH BASINS MEASURED FROM THE TOP OF THE CURB TO THE INVERT OF CONNECTOR PIPE.
27. HYDRAULIC GRADE LINES SHOWN IN PROFILES ARE FOR 100 YEAR FREQUENCY FLOWS, UNLESS OTHERWISE NOTED.
28. ALL BACKFILL AND BEDDING AROUND STRUCTURES AND PIPES SHALL BE COMPACTED TO NOT LESS THAN 90 PERCENT RELATIVE COMPACTION EXCEPT WHERE SUCH MATERIAL IS PLACED UNDER EXISTING PAVED ROADWAYS. THE TOP 3 FEET, MEASURED FROM THE FINISH PAVING, SHALL BE COMPACTED TO 95 PERCENT RELATIVE COMPACTION.
29. CONTRACTOR SHALL DISPOSE OF ALL EXCESS EXCAVATED MATERIAL AT MANDATORY DISPOSAL SITE.
30. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS, AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND PER LATEST COUNTY STANDARD AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED. FOR PAVEMENT OVERLAY, 0.10' MIN. FOR FULL LANE WIDTH IS REQUIRED.
31. ALL UNDERGROUND FACILITIES WITH LATERALS SHALL BE IN PLACE PRIOR TO PAVING THE STREET, INCLUDING BUT NOT LIMITED TO, THE FOLLOWING: SEWER, WATER, ELECTRIC, STORM DRAINS.
32. ALL SURVEY MONUMENTS SHALL BE REPLACED AS REQUIRED. MONUMENTS SHALL BE TIED OUT PRIOR TO CONSTRUCTION AND REPLACED UPON COMPLETION OF CONSTRUCTION.

PW#2022-0085

DIGALERT Call 2 Working Days Before You Dig! 811

BENCHMARK:

IN BEAUMONT,AT THE JUNCTION OF CALIFORNIA AVENUE AND FIFTH PLACE. 28.9 M (94.8FT) WEST OF THE AVENUE CENTERLINE, 7.7 M (25.3 FT) SOUTH OF THE CENTERLINE OF FIFTH PLACE, 1.1 M (3.6 FT) NORTH OF A GUY WIRE, 0.79 M (2.6 FT) SOUTH OF A POWER POLE, 0.18 M (0.6 FT) EAST OF A WITNESS POST.
THE MARK IS 0.6 METERS W FROM A SECOND WITNESS POST. THE MARK IS ABOVE LEVEL WITH THE AVENUE.

ELEV. 2576.61, NGVD 29

BY	MARK	DESCRIPTION	APPR.	DATE
	1			

ENGINEER — REVISIONS — CITY

BLUE Engineering & Consulting, Inc
9320 BASELINE RD., STE. D - RANCHO CUCAMONGA, CA 91701
INFO@BLUECIVILENG.COM - WWW.BLUECIVILENG.COM
909-248-6557

SEAL

ANGEL CESAR, P.E.
R.C.E. 87222 EXP. 09/30/23

11 / 08 / 2022
DATE

REGISTERED PROFESSIONAL ENGINEER — ANGEL CESAR — No. 87222 — CIVIL — STATE OF CALIFORNIA

DESIGN BY:
DRAWN BY:
CHECKED BY:
SCALE:
DATE:
JOB NUMBER:

BEAUMONT — CALIFORNIA
PUBLIC WORKS DEPARTMENT
550 E. 6TH ST, BEAUMONT, CA 92223

Reviewed By: _____ STAFF ENGINEER Date: _____
Recommended for Approval By: _____ PRINCIPAL ENGINEER Date: 11/09/2022
Approved By: _____ CITY ENGINEER Date: 11/09/2022

CITY OF BEAUMONT, PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
550E. 6th St
Beaumont, CA 92223
TEL: (951) 769-8520 FAX: (951) 769-8526

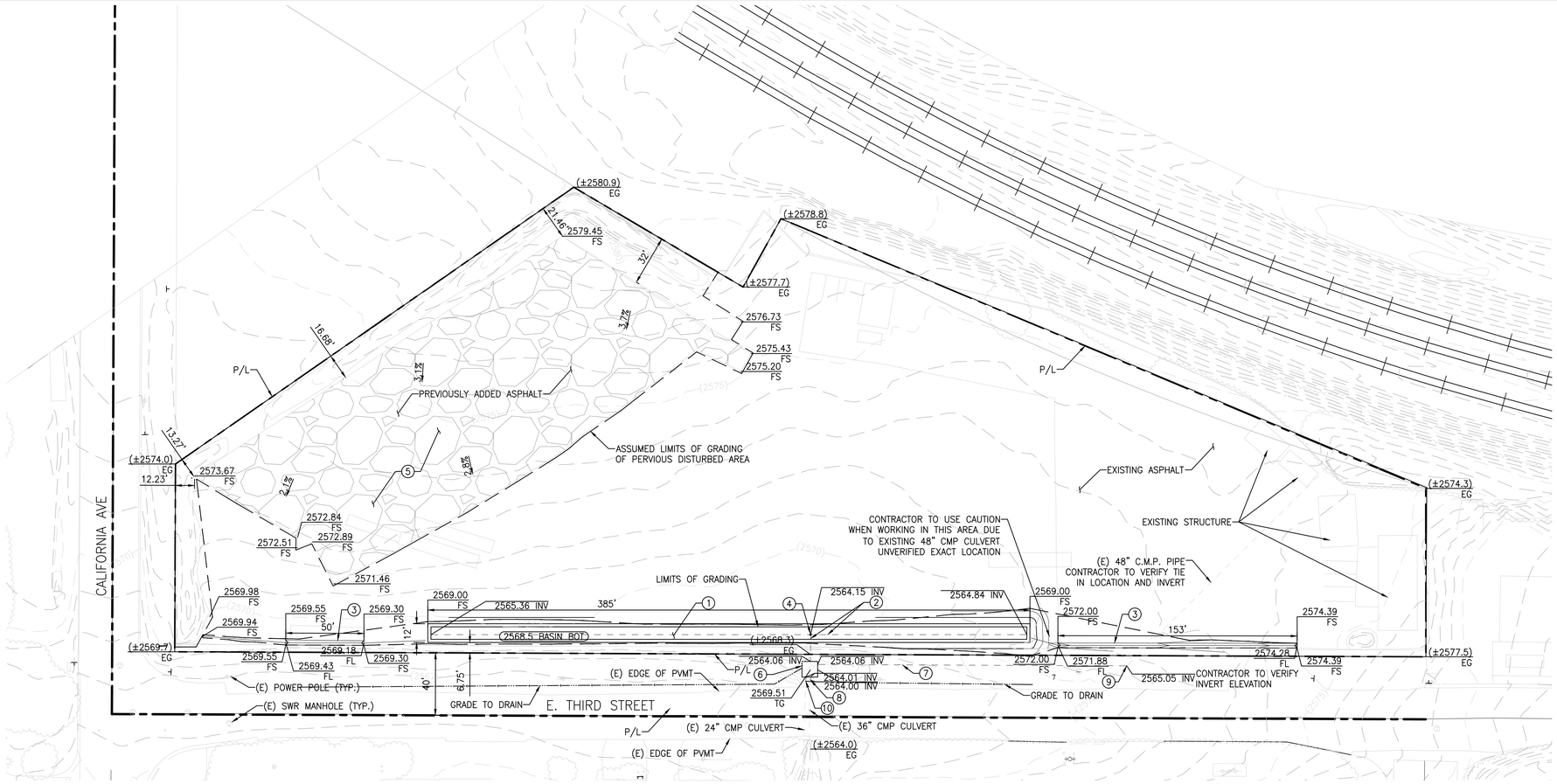
CITY OF BEAUMONT, CALIFORNIA
GRADING PLANS FOR:
202 E. THIRD STREET
APN. 418-200-003, -004, -005

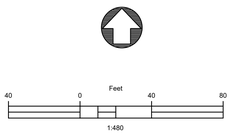
GENERAL NOTES

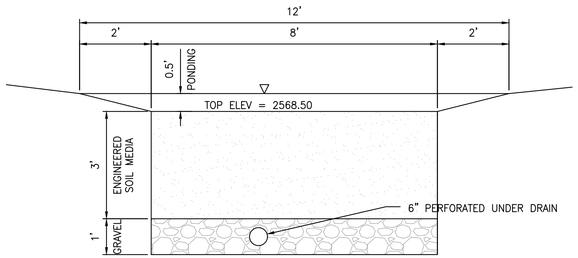
SHEET 2 OF 4 SHEETS
FILE NO: 3449

CONSTRUCTION NOTES

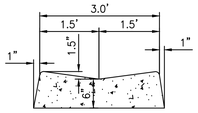
①	CONSTRUCT BIO-RETENTION BASIN
②	INSTALL 6" UNDER DRAIN PERFORATED PVC PIPE
③	INSTALL 3' WIDE CONCRETE VALLEY GUTTER PER DETAIL ON SHEET 2
④	INSTALL 1' PVC OVERFLOW INLET
⑤	PREVIOUSLY INSTALLED 4" ASPHALT OVER 4" A.B.
⑥	INSTALL DROP INLET MODIFIED TO ACCEPT FLOW. SEE DETAIL ON SHEET 3.
⑦	CONTRACTOR TO REMOVE EXISTING 24" CMP PIPE AND REPLACE WITH 48" HDPE PIPE
⑧	INSTALL 36" CMP PIPE AND COLLAR TO JOIN EXISTING
⑨	INSTALL 48" 45° BEND PIPE
⑩	INSTALL 24" CMP PIPE AND COLLAR TO JOIN EXISTING



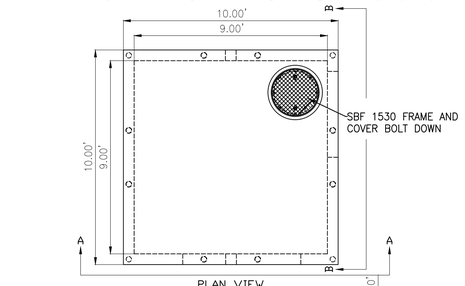




BIO-RETENTION DETAIL
SCALE: 1" = 2'



VALLEY GUTTER DETAIL
SCALE: N.T.S.



MODIFIED DROP INLET DETAIL
SCALE: N.T.S.

PW#2022-0085

DIGALERT Call 2 Working Days Before You Dig! 811

BENCHMARK:

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ELEV. 2576.61, NGVD 29

ENGINEER

BY	MARK	DESCRIPTION	APPR.	DATE
	1			

REVISIONS

CITY

BLUE Engineering & Consulting, Inc
9320 BASELINE RD., STE. D – RANCHO CUCAMONGA, CA 91701
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909-248-6557

SEAL

ANGEL CESAR, P.E.
R.C.E. 87222 EXP. 09/30/23

11 / 08 / 2022
DATE

REGISTERED PROFESSIONAL ENGINEER — ANGEL CESAR — No. 87222 — CIVIL — STATE OF CALIFORNIA

DESIGN BY:
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PUBLIC WORKS DEPARTMENT
550 E. 6TH ST, BEAUMONT, CA 92223

Reviewed By: _____ STAFF ENGINEER Date: _____

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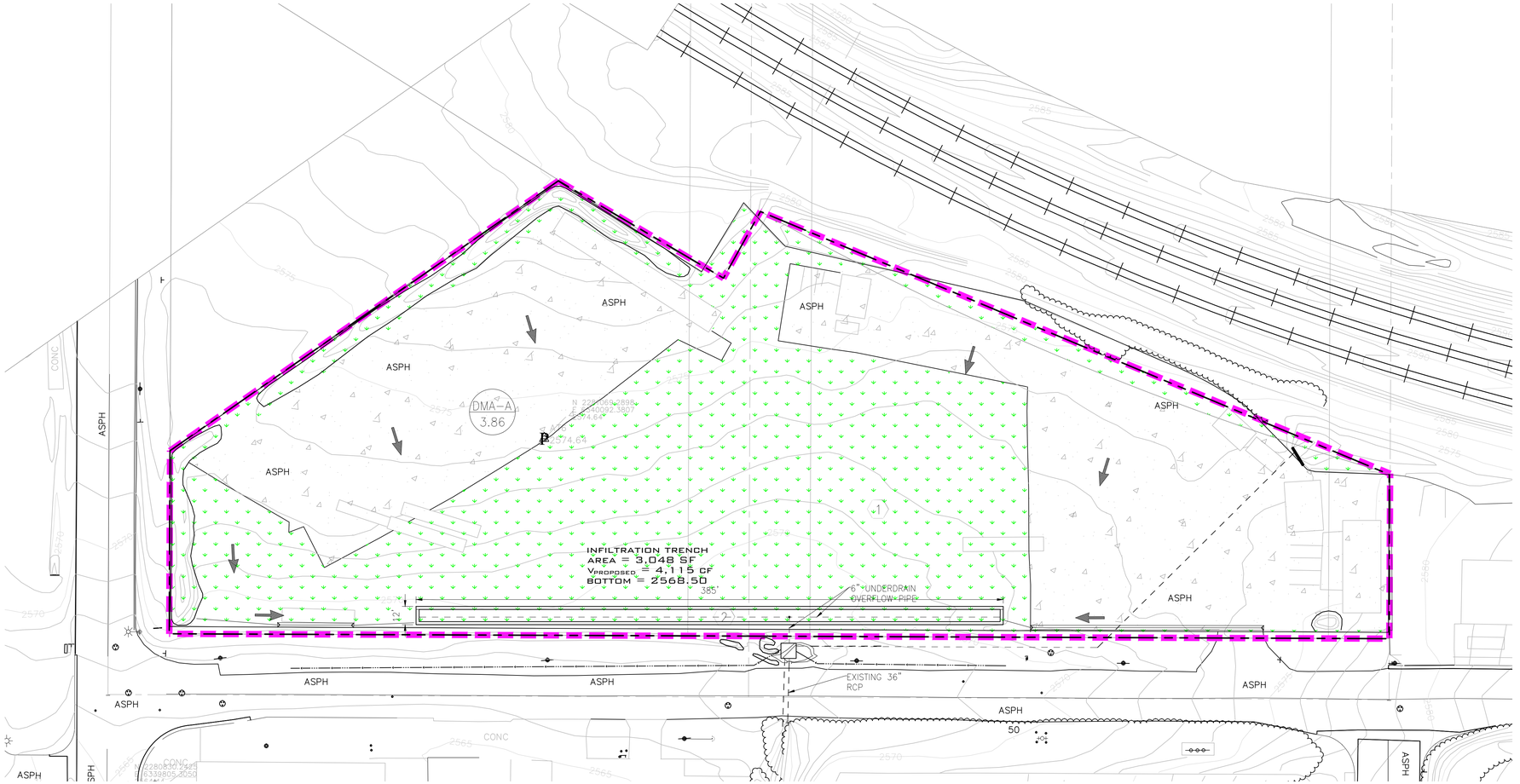
Approved By: _____ CITY ENGINEER Date: 11/09/2022

CITY OF BEAUMONT, PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
550E. 6th St
Beaumont, CA 92223
TEL: (951) 769-8520 FAX: (951) 769-8526

CITY OF BEAUMONT, CALIFORNIA
GRADING PLANS FOR:
202 E. THIRD STREET
APN. 418-200-003, -004, -005

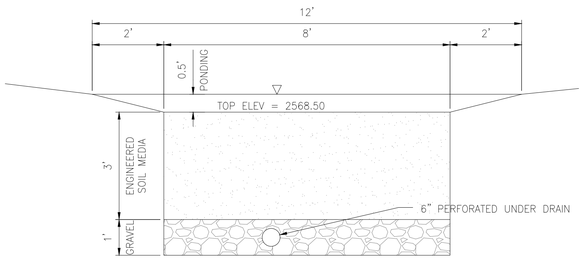
PRELIMINARY GRADING PLAN

SHEET 3 OF 4 SHEETS
FILE NO: 3449



LEGEND

- WATERSHED BOUNDARY
- CENTERLINE
- DRAINAGE ARROW
- LANDSCAPE AREA
- IMPERVIOUS AREA



BIO-RETENTION DETAIL
SCALE: 1" = 2'

PROJECT BMP CONFORMANCE ANALYSIS

NAME	AREA (SF)	IMPERVIOUS AREA (SF)	PERVIOUS AREA (SF)	I_f	C	V_{BMP}	BMP	$A_{PROVIDED}$	$V_{PROVIDED}$
DMA A	168,200	77,570	90,630	0.461	0.32	3,754 CF	BIO-RETENTION BASIN	3,048 SF	5,878 CF

PROJECT AREA BREAKDOWN

PROJECT TOTAL AREA	164,475 SF
PROJECT PAVEMENT AREA	79,832 SF
PROJECT LANDSCAPE AREA	84,643 SF

BMP MAINTENANCE

BMP	NAME	MAINTENANCE TYPE	FREQUENCY
1	LANDSCAPING, PARK AND TRASH	TRASH CLEANUP	ONCE A WEEK
2	BIO-RETENTION BASIN	TRASH CLEANUP	ONCE A WEEK

PW#2022-0085

DIGALERT — Call 2 Working Days Before You Dig! 811

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11 / 08 / 2022
ANGEL CESAR, P.E. — DATE
R.C.E. 87222 EXP. 09/30/23

REGISTERED PROFESSIONAL ENGINEER — ANGEL CESAR — No. 87222 — CIVIL — STATE OF CALIFORNIA

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CITY OF BEAUMONT, CALIFORNIA
GRADING PLANS FOR:
202 E. THIRD STREET
APN. 418-200-003, -004, -005

WQMP EXHIBIT

SHEET 4 OF 4 SHEETS
FILE NO: 3449

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

GeoTek, Inc.
1548 North Maple Street, Corona, California 92878
(951) 710-1160 Office (951) 710-1167 Fax www.geotekusa.com

July 7, 2022
Project No. 3257-CR

Premium Land Development
108 Orange Street, Suite 5
Redlands, California 92373

Attention: Mr. Corey Smith

Subject: **Infiltration Evaluation**
Existing Commercial Facility
Assessor's Parcel Numbers 418-200-003, -004 and -005
202 East 3rd Street
City of Beaumont, Riverside County, California

Reference: See Page 5

Dear Mr. King:

As requested and authorized, GeoTek, Inc. (GeoTek) has performed an Infiltration Evaluation associated with the existing commercial facility located at 202 East 3rd Street, in the City of Beaumont, Riverside County, California. The intent of this study is to evaluate the infiltration properties of the underlying soils within the proposed project storm water disposal area (infiltration trench). This report presents the results of the evaluation performed by GeoTek.

Site Description

The project site is located at 202 East 3rd Street, in the City of Beaumont, Riverside County, California. The site can generally be accessed from East 3rd Street to the south. The site is currently occupied by a commercial facility and associated parking/drive areas.

The site consists of gently sloping terrain. Elevations across the site range from approximately 2,570 feet msl (mean sea level) to 2,580 feet msl. Site drainage is locally by sheet flow to the south.

Infiltration Testing

Two (2) percolation test borings were excavated with a truck-mounted hollow stem auger drill rig to a depth of approximately five (5) feet below the existing ground surface (bgs) at the

proposed infiltration trench location, as provided by Blue Engineering & Consulting, Inc. The approximate locations of the percolation test borings are indicated on the attached Infiltration Test Location Map provided as Figure 1.

The borings were approximately 8-inches in diameter each. A four-inch diameter slotted PVC pipe encapsulated in filter sock was inserted into the test holes. The annular space between the test hole sidewalls and PVC pipe was filled with gravel.

The material encountered in the borings was clayey sand to sandy clay (SC and CL soil types based upon the Unified Soil Classification System). The logs of the borings are presented in Appendix A.

Groundwater was not encountered nor observed in the borings excavated for this evaluation. Based on a review of groundwater depths noted on the State Department of Water Resources Water Data Library website, it is estimated a historic high groundwater depth of greater than 50 feet below existing grade exists at the site.

Subsequent to pre-soaking the test holes in general conformance with the referenced document (County of Riverside, 2011), percolation testing was performed in the lower approximately 12 inches in each of the percolation borings. The percolation testing was conducted in general conformance with the referenced document prepared by the County of Riverside. The percolation rate was converted to an infiltration rate via the Porchet Method.

The infiltration rates for the borings are presented in the follow table after the water level had stabilized.

Boring No.	Infiltration Rate (inches per hour)	Depth of Boring (feet)
Boring I-1	0.0	5
Boring I-2	0.0	5

Copies of the percolation data sheets and infiltration conversion sheets (Porchet Method) are included in Appendix B.

The reported infiltration rates are the measured rates without any factor of safety applied. Over the lifetime of the water quality facility, the infiltration rates may be affected by silt build up and biological activities, as well as local variations in near surface soil conditions. A suitable factor of safety should be applied to the field rates in design the infiltration systems.

It should be noted that the infiltration rates provided above were performed in relatively undisturbed native materials. Infiltration rates will vary and are mostly dependent on the underlying consistency of the site soils and relative density. Infiltration rates will be impacted by weight of equipment travelling over the soils, placement of engineered fill and other various factors. GeoTek, Inc. assumes no responsibility or liability for the ultimate design or performance of the storm water facilities.

LIMITATIONS

The earth materials observed on the project site appear to be representative of the tested areas; however, soil materials vary in character between excavations and natural outcrops or conditions exposed during site construction. Site conditions may vary due to seasonal changes or other factors. GeoTek, Inc. assumes no responsibility or liability for work, testing or recommendations performed or provided by others.

GeoTek's conclusions and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty is expressed or implied. Standards of practice are subject to change with time.

The opportunity to be of service on this project is sincerely appreciated. If you should have any questions, please do not hesitate to contact GeoTek.

Respectfully submitted,
GeoTek, Inc.

Edward H. LaMont
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Project Geologist

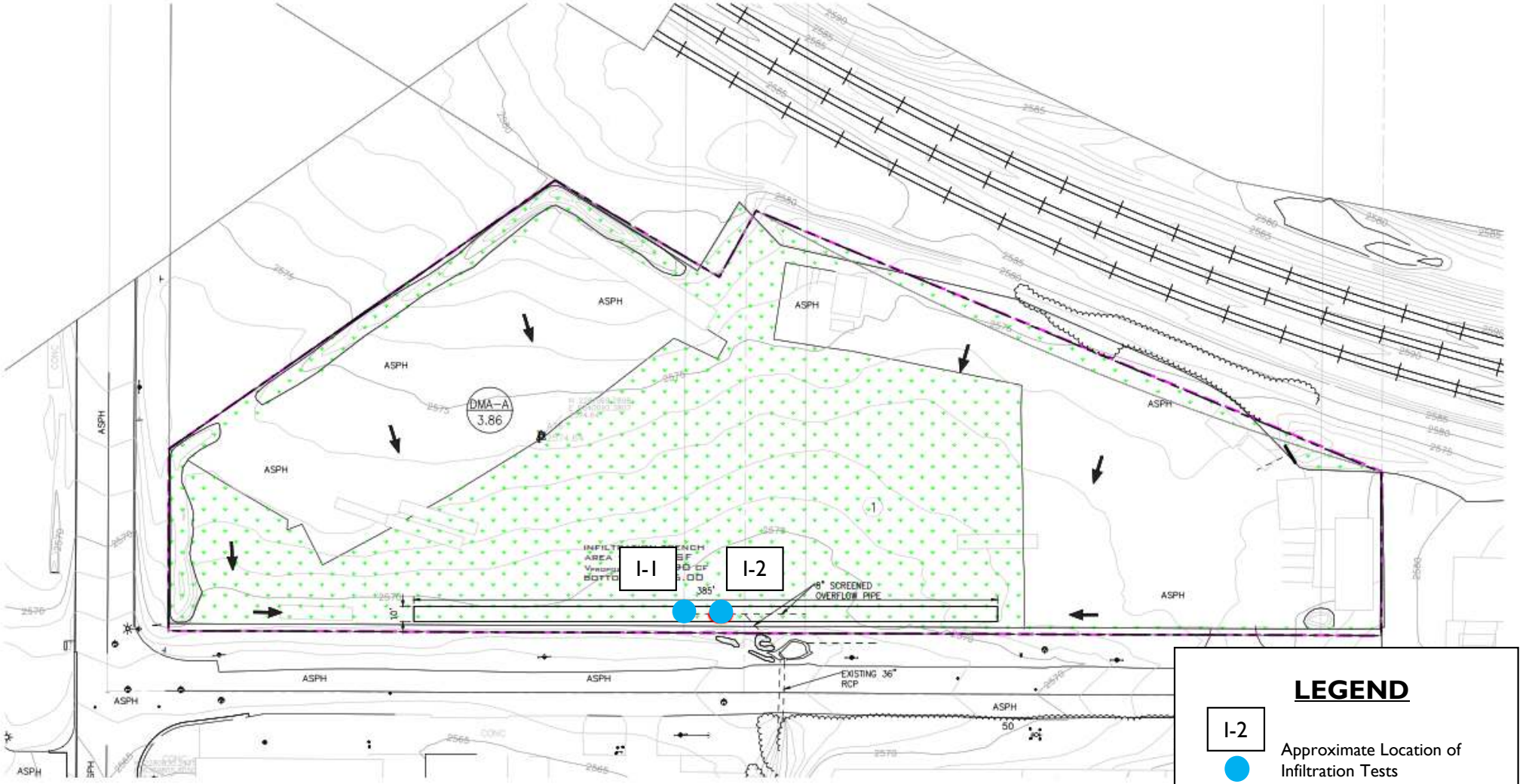
Enclosures: Figure 1– Infiltration Test Location Map
Appendix A – Logs of Exploratory Borings
Appendix B – Percolation Data Sheets and Conversion Sheets (Porchet Method)

Distribution: (1) Addressee via email (PDF file)

G:\Projects\3252 to 3302\3257CR Premium Land Development 202 East Third Street Beaumont\Infiltration Evaluation\3257CR Infiltration Evaluation Beaumont.doc

REFERENCE

County of Riverside, 2011, "Technical Guidance Document Appendix A – Infiltration Testing," dated September.



Premium Land Development
APNs 418-200-003, -004 and -005
202 East Third Street
Beaumont, Riverside County, California

GeoTek Project No. 3257-CR

NORTH

Figure 1

Infiltration
Test Location Map

GEOTEK

APPENDIX A

LOGS OF EXPLORATORY BORINGS

202 East 3rd Street
City of Beaumont, Riverside County, California
Project No. 3257-CR

GEOTEK

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Premium Land Development, LLC	**DRILLER:**	2R Drilling	**LOGGED BY:**	Kevin
PROJECT NAME:	202 E. 3rd St. Beaumont	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Eddie
PROJECT NO.:	3257-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Beaumont			**DATE:**	7/5/2022

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	Boring No.: I-1 / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0				SC	**Older Alluvium:** Clayey m-c Sand, light brown, slightly moist, few gravel			
				CL	f-c Sandy Clay, red-brown, moist, trace gravel			
5					**BORING TERMINATED AT 5 FEET** No groundwater encountered. Boring set up for infiltraion testing with perforated drain pipe pipe, and 3/4" gravel.			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Premium Land Development, LLC	**DRILLER:**	2R Drilling	**LOGGED BY:**	Kevin
PROJECT NAME:	202 E. 3rd St. Beaumont	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Eddie
PROJECT NO.:	3257-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Beaumont			**DATE:**	7/5/2022

Boring No.: I-2

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0				CL	**Older Alluvium:** f-c Sandy Clay, red-brown, moist, few gravel			
5					**BORING TERMINATED AT 5 FEET** No groundwater encountered. Boring set up for infiltration testing with perforated pipe, and 3/4" gravel.			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

APPENDIX B

PERCOLATION DATA AND CONVERSION SHEETS

202 East 3rd Street
City of Beaumont, Riverside County, California
Project No. 3257-CR

GEOTEK

PERCOLATION DATA SHEET

Project: 202 East Third Street, Beaumont **Job No.:** 3257-CR
Test Hole No.: I-1 **Tested By: Kevin G** **Date: 7-6-22**
Depth of Hole As Drilled: **Before Test:** **After Test:**

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final water Level (Inches)	Δ in Water Level (Inches)	Rate (minutes per Inch)	Comments
1	7:00 ———	25	60	48	48	0	0	water reading is from surface
2	7:26 ———	25	60	48	48	0	0	
3	7:53 ———	30	60	48	48	0	0	
4	8:25 ———	30	60	48	48	0	0	
5	9:08 ———	30	60	48	48	0	0	
6	9:39 ———	30	60	48	48	0	0	
7	10:15 ———	30	60	48	48	0	0	
8	10:46 ———	30	60	48	48	0	0	
9	11:17 ———	30	60	48	48	0	**0**	
10	11:49 ———	30	60	48	48	0	**0**	

PERCOLATION DATA SHEET

Project: 202 East Third Street, Beaumont **Job No.:** 3257-CR
Test Hole No.: I-1 **Tested By: Kevin G** **Date: 7-6-22**
Depth of Hole As Drilled: **Before Test:** **After Test:**

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final water Level (Inches)	Δ in Water Level (Inches)	Rate (minutes per Inch)	Comments
11	12:20 _____	30	60	48	48	0	0	water reading is from surface for all tests
12	12:51 _____	30	60	48	48	0	0	
13	1:22 _____	30	60	48	48	0	0	
14	1:54 _____	30	60	48	48	0	0	

PERCOLATION DATA SHEET

Project: 202 East Third Street, Beaumont **Job No.:** 3257-CR
Test Hole No.: I-2 **Tested By: Kevin G** **Date: 7-6-22**
Depth of Hole As Drilled: **Before Test:** **After Test:**

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final water Level (Inches)	Δ in Water Level (Inches)	Rate (minutes per Inch)	Comments
1	6:55 _____	25	60	48	48	0	0	water reading is from surface
2	7:21 _____	25	60	48	48	0	0	
3	7:50 _____	30	60	48	48	0	0	
4	8:28 _____	30	60	48	48	0	0	
5	9:06 _____	30	60	48	48	0	0	
6	9:41 _____	30	60	48	48	0	0	
7	10:13 _____	30	60	48	48	0	0	
8	10:44 _____	30	60	48	48	0	0	
9	11:15 _____	30	60	48	48	0	**0**	
10	11:46 _____	30	60	48	48	0	**0**	

PERCOLATION DATA SHEET

Project: 202 East Third Street, Beaumont **Job No.:** 3257-CR
Test Hole No.: I-2 **Tested By: Kevin G** **Date: 7-6-22**
Depth of Hole As Drilled: **Before Test:** **After Test:**

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final water Level (Inches)	Δ in Water Level (Inches)	Rate (minutes per Inch)	Comments
11	12:17 _____	30	60	48	48	0	0	water reading is from surface for all tests
12	12:48 _____	30	60	48	48	0	0	
13	1:19 _____	30	60	48	48	0	0	
14	1:51 _____	30	60	48	48	0	0	

Client:	**Premium Land Development**
Project:	**Beaumont**
Project No:	**3257-CR**
Date:	**7/6/2022**

Boring No. **I-1**

Percolation Rate (Porchet Method)

Time Interval, Δt =	30
Final Depth to Water, D_F =	12
Test Hole Radius, r =	4
Initial Depth to Water, D_O =	12
Total Test Hole Depth, D_T =	60

Equation - $I_t = \dfrac{\Delta H\ (60r)}{\Delta t\ (r+2H_{avg})}$

$H_O = D_T - D_O$ =	48
$H_F = D_T - D_F$ =	48
$\Delta H = \Delta D = H_O - H_F$ =	0
$Havg = (H_O+H_F)/2$ =	48

I_t = 0.00 **Inches per Hour**

GEOTEK

Client:	**Premium Land Development**
Project:	**Beaumont**
Project No:	**3257-CR**
Date:	**7/6/2022**

Boring No. **I-2**

Percolation Rate (Porchet Method)

Time Interval, Δt =	30
Final Depth to Water, D_F =	12
Test Hole Radius, r =	4
Initial Depth to Water, D_O =	12
Total Test Hole Depth, D_T =	60

Equation - $I_t = \dfrac{\Delta H\ (60r)}{\Delta t\ (r+2H_{avg})}$

$H_O = D_T - D_O$ =	48
$H_F = D_T - D_F$ =	48
$\Delta H = \Delta D = H_O - H_F$ =	0
$Havg = (H_O+H_F)/2$ =	48

I_t = 0.00 **Inches per Hour**

GEOTEK

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Western Riverside Area, California

May 9, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....11
Map Unit Descriptions.....11
Western Riverside Area, California.....13
RaB2—Ramona sandy loam, 2 to 5 percent slopes, eroded.....13
RaC3—Ramona sandy loam, 5 to 8 percent slopes, severely eroded.....14
RaD3—Ramona sandy loam, 8 to 15 percent slopes, severely eroded.....15
References.....17

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

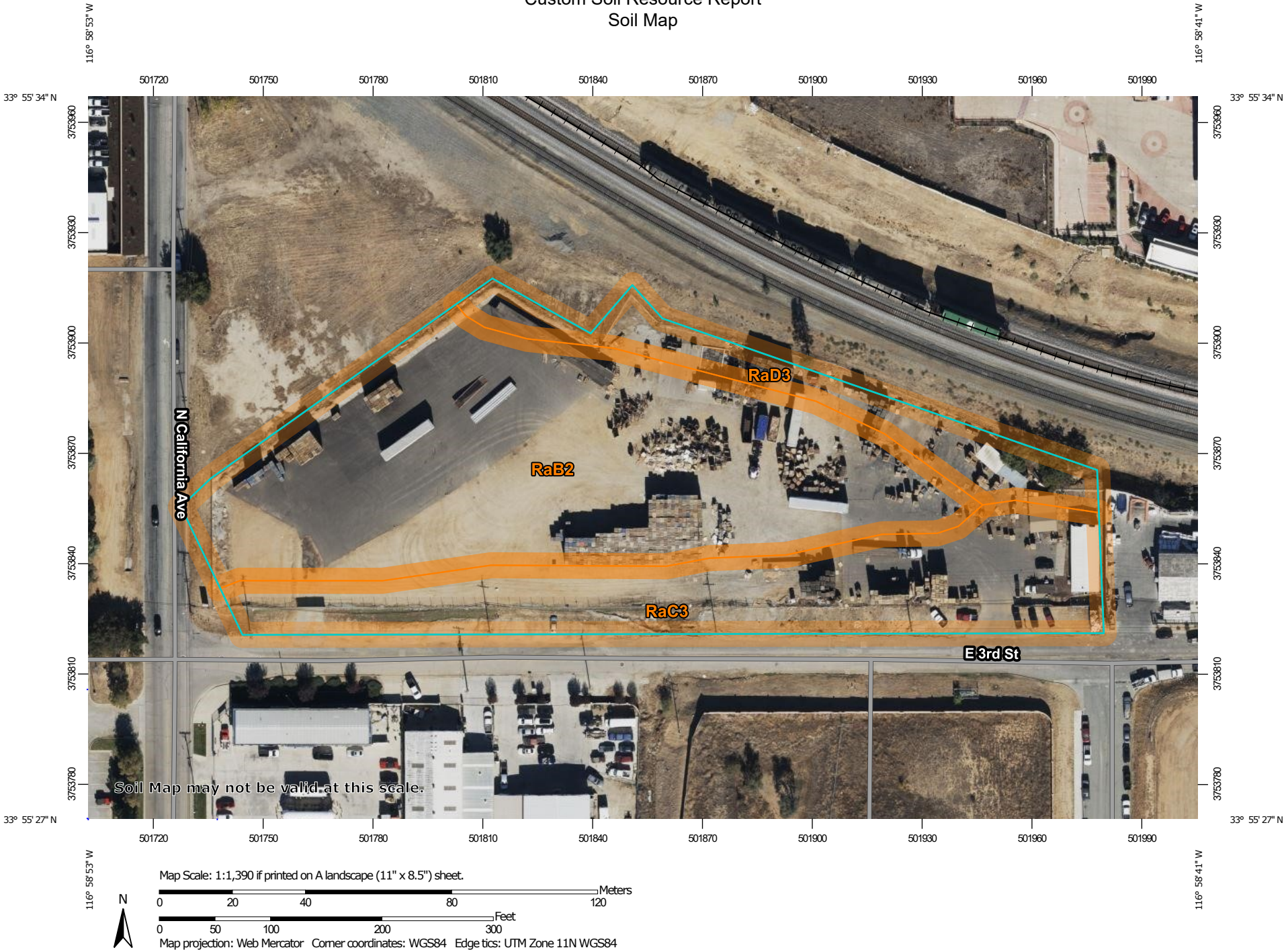
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,390 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 15, 2020—Nov 19, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
RaB2	Ramona sandy loam, 2 to 5 percent slopes, eroded	2.5	58.1%
RaC3	Ramona sandy loam, 5 to 8 percent slopes, severely eroded	1.3	30.1%
RaD3	Ramona sandy loam, 8 to 15 percent slopes, severely eroded	0.5	11.7%
Totals for Area of Interest		**4.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate

pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Western Riverside Area, California

RaB2—Ramona sandy loam, 2 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcy5
Elevation: 250 to 3,500 feet
Mean annual precipitation: 10 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 320 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Ramona and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ramona

Setting

Landform: Terraces, alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 14 inches: sandy loam
H2 - 14 to 23 inches: fine sandy loam
H3 - 23 to 68 inches: sandy clay loam
H4 - 68 to 74 inches: gravelly sandy loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Hanford

Percent of map unit: 4 percent

Hydric soil rating: No

Arlington

Percent of map unit: 4 percent
Hydric soil rating: No

Greenfield

Percent of map unit: 4 percent
Hydric soil rating: No

Tujunga

Percent of map unit: 3 percent
Hydric soil rating: No

RaC3—Ramona sandy loam, 5 to 8 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: hcy8
Elevation: 250 to 3,500 feet
Mean annual precipitation: 10 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 320 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Ramona and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ramona

Setting

Landform: Terraces, alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 8 inches: sandy loam
H2 - 8 to 11 inches: fine sandy loam
H3 - 11 to 68 inches: sandy clay loam
H4 - 68 to 74 inches: gravelly sandy loam

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Hanford

Percent of map unit: 5 percent
Hydric soil rating: No

Greenfield

Percent of map unit: 5 percent
Hydric soil rating: No

Tujunga

Percent of map unit: 5 percent
Hydric soil rating: No

RaD3—Ramona sandy loam, 8 to 15 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: hcyb
Elevation: 250 to 3,500 feet
Mean annual precipitation: 10 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 320 days
Farmland classification: Not prime farmland

Map Unit Composition

Ramona and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ramona

Setting

Landform: Terraces, alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 8 inches: sandy loam

H2 - 8 to 17 inches: fine sandy loam
H3 - 17 to 68 inches: sandy clay loam
H4 - 68 to 74 inches: gravelly sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Greenfield

Percent of map unit: 5 percent
Hydric soil rating: No

Hanford

Percent of map unit: 5 percent
Hydric soil rating: No

Tujunga

Percent of map unit: 5 percent
Hydric soil rating: No

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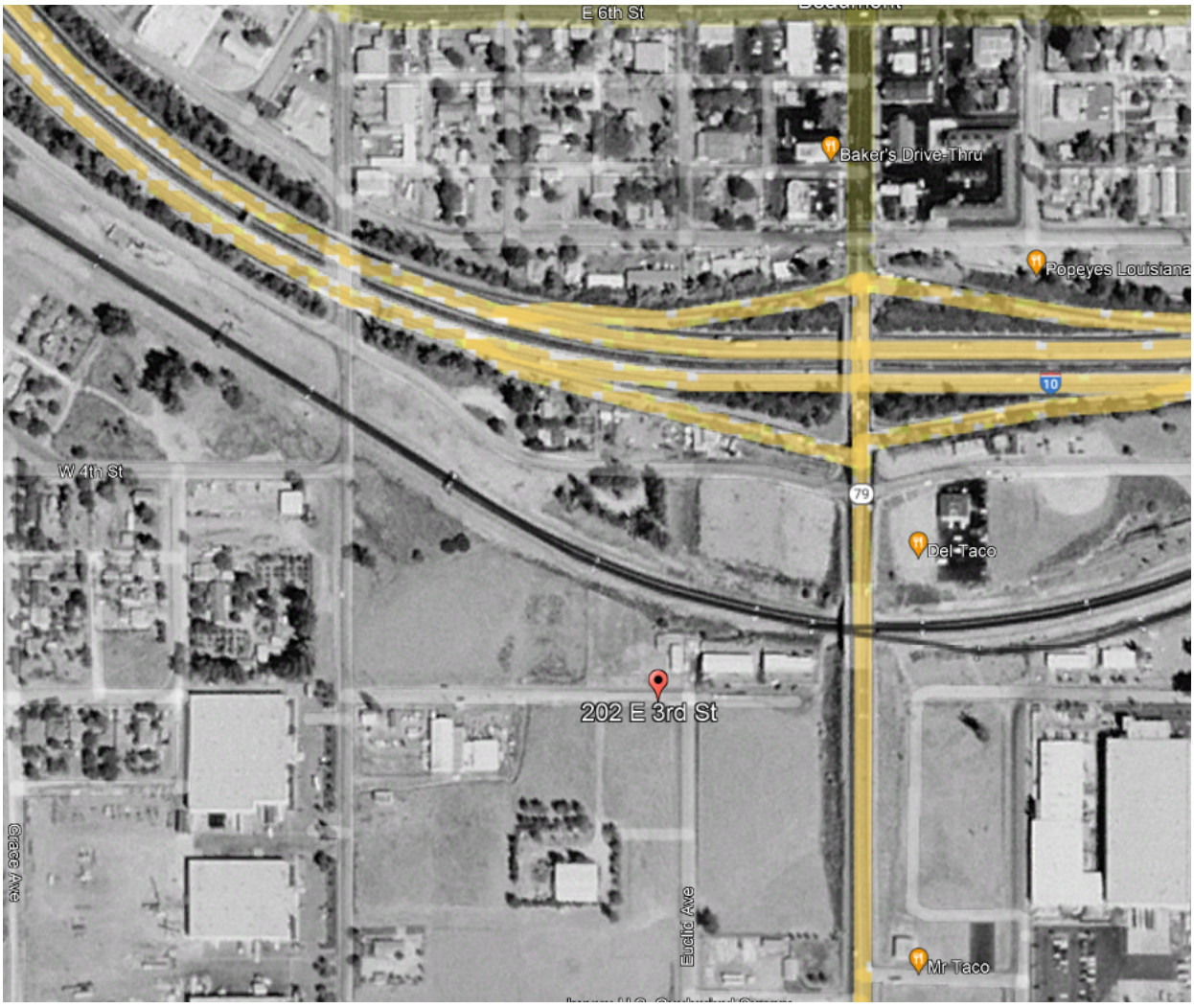
Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

The project site has been vacant for quite some time. Below is a Google image from 1996 the earliest image available.



Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Reference page 59 form Riverside County WQMP Guidance

TABLE 3-4. LID BMP Applicability

LID BMP Hierarchy	A	B	C	D
	K_{SAT}> 1.6"/hr., and no restrictions on infiltration	Are Harvest and Use BMPs feasible?	0.3"/hr. < K_{SAT} < 1.6"/hr., or unpredictable or unknown	K_{SAT} < 0.3"/hr.
LID Infiltration BMPs*	✓			
Harvest and Use BMPs		✓		✓
LID Bioretention	✓		✓	✓
LID Biotreatment				✓

Notes for Table 3-5:

***See also** Figure 3-6 for guidance in selecting appropriate BMPs*

***Column A:** Selections from this column may be used in locations where the infiltration rate of underlying soils is at least 1.6" per hour and no restrictions on infiltration apply to these locations.*

***Column B:** Harvest and Use BMPs may be used where it can be shown that there is sufficient demand for harvested water and where LID Infiltration BMPs are not feasible.*

***Column C:** Selections in this column may be used in locations where the measured infiltration rate of underlying soils is between 0.3" and 1.6" per hour or where, in accordance with recommendations of a licensed geotechnical engineer, the post-development saturated hydraulic conductivity is uncertain or unknown or cannot be reliably predicted because of soil disturbance or fill, anisotropic soil characteristics, presence of clay lenses, or other factors.*

***Column D:** Selections in this column may be used in locations where the infiltration rate of underlying soils is 0.3" per hour or less. See Chapter 2 for more information.*

** Permeable Pavement, when designed with a maximum of a 2:1 ratio of impervious area to pervious pavement areas, or less, is considered a self-retaining area, and is not considered an LID BMP for the purposes of this table. This table focuses on the 'special case' included in the discussion of 'areas draining to self-retaining areas' above, where a project proponent can choose to design the pervious pavement as a LID BMP in accordance with an approved design, such as the LID BMP Design handbook, and in return drain additional impervious area onto the pervious pavement beyond the 2:1 ratio.*

3.4.2.a. Laying out your LID BMPs

Finding the right location for LID BMPs on your site involves a careful and creative integration of several factors:

- ✓ To make the most efficient use of the site and to maximize aesthetic value, **integrate BMPs with site landscaping**. Many local zoning codes may require landscape setbacks or buffers, or may specify that a minimum portion of the site be landscaped. It may be possible to locate some or all of your site's Stormwater BMPs within this same area, or within utility easements or other non-buildable areas.

- ✓ Bioretention BMPs must be **level or nearly level** all the way around. When configured in a linear fashion (similar to swales) bioretention BMPs may be gently sloped end to end, but opposite sides must be at the same

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

R 07 W | R 06 W | R 05 W | R 04 W | R 03 W | R 02 W | R 01 W | R 01 E | R 02 E | R 03 E | R 04 E | R 05 E

T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S

06	05	04	03	02	01
07	08	09	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.68 PigeonPass
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
Project Site
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.90 HurkeyCreek
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley

Santa Ana River Watershed
Santa Margarita Watershed

JURUPA VALLEY | EASTVALE | NORCO | CORONA | RIVERSIDE | MORENO VALLEY | CALIMESA | BEAUMONT | SAN JACINTO | PERRIS | HEMET | CANYON LAKE | LAKE ELSINORE | MENIFEE | WILDOMAR | MURRIETA | TEMECULA

N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Blue Engineering & Consulting, Inc.	Date	7/19/2022
Designed by	A. Cesar	Case No	PW2022-0878
Company Project Number/Name	202 E. Third Street		

BMP Identification

BMP NAME / ID: BMP #1 - Bio-Retention Basin

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.85 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1	*168200*	*Mixed Surface Types*	*0.461*	*0.32*	*53001.1*			
	168200		***Total***		**53001.1**	**0.85**	***3754.2***	***4115***

Notes:

Bioretention Facility - Design Procedure	BMP ID #1	Legend:	Required Entries / Calculated Cells

Company Name: Blue Engineering & Consulting, Inc. Date: 7/19/2022

Designed by: A. Cesar County/City Case No.: PW2022-0 878

Design Volume

Enter the area tributary to this feature A_T= 3.86 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook V_{BMP}= 3,754 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb w_T = 12.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ d_E = 1.74 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 2,156 ft^2

Proposed Surface Area A= 3,048 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility z = 4 :1

Diameter of Underdrain 6 inches

Longitudinal Slope of Site (3% maximum) 2 %

6" Check Dam Spacing 25 feet

Describe Vegetation:

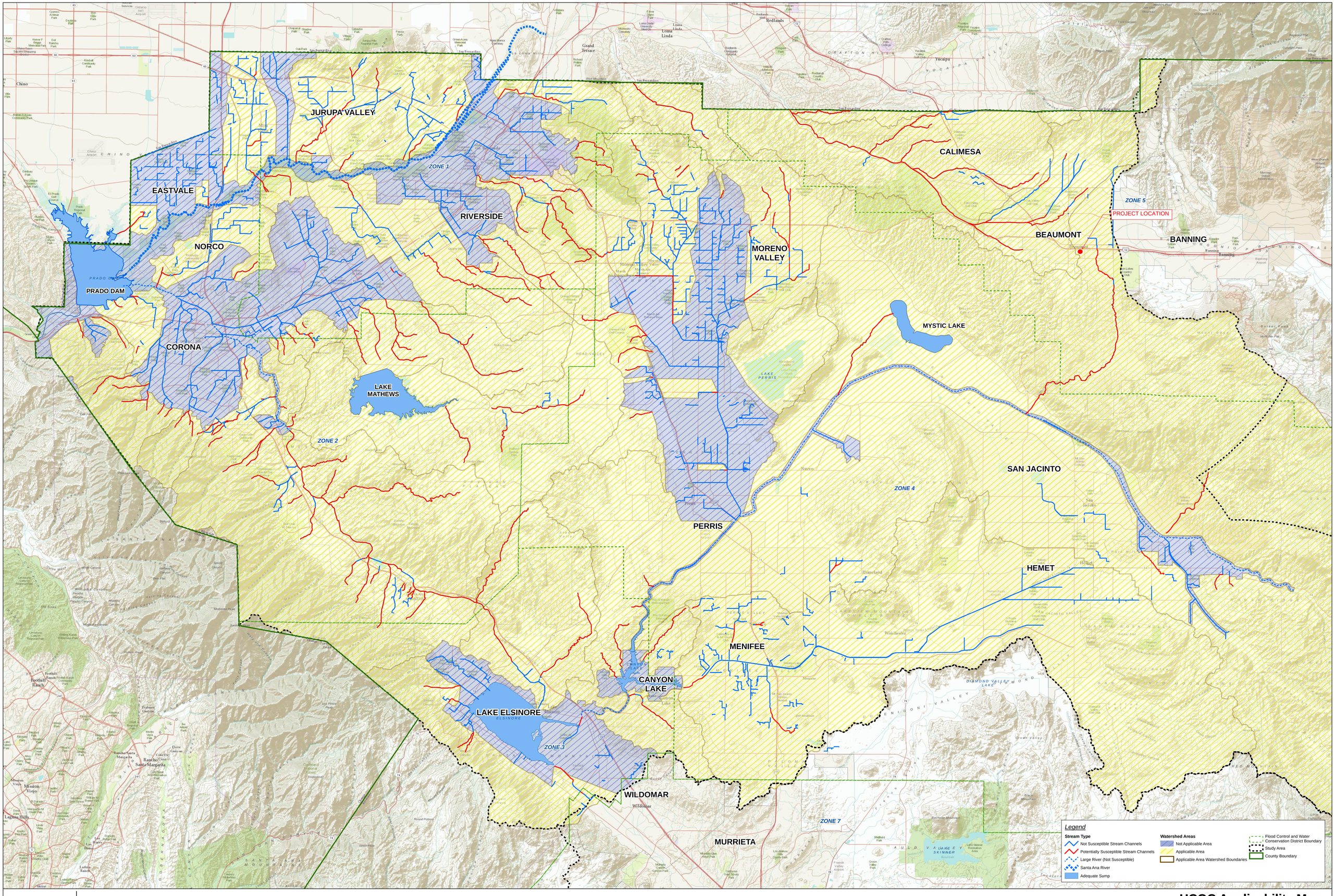
Notes:

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

This project is not HCOC exempt per the HCOC Applicability map. In order to comply a bioretention basin is being proposed. The 2 year 24 hour storm event was ran to show that the basin is sized adequately to store the flood volume difference from the pre development to post development condition.

	2 year – 24 hour			
	Pre-condition	**Post-condition**	**Difference**	**Bioretention Basin Volume**
Volume (Cubic Feet)	11,609.0	17,187.3	5,578.3	5,878.05



HCOC Applicability Map

Hydromodification Susceptibility Documentation Report and Mapping
Riverside County Flood Control and Water Conservation District

Map 2

U n i t H y d r o g r a p h A n a l y s i s

Study date 08/18/22 File: 164preuh242.out

++

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6481

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

---
202 E. Third Street
Pre Development UH
2 yr
24 hr

Drainage Area = 3.86(Ac.) = 0.006 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 3.86(Ac.) = 0.006 Sq. Mi.
Length along longest watercourse = 341.00(Ft.)
Length along longest watercourse measured to centroid = 238.00(Ft.)
Length along longest watercourse = 0.065 Mi.
Length along longest watercourse measured to centroid = 0.045 Mi.
Difference in elevation = 12.60(Ft.)
Slope along watercourse = 195.0968 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.019 Hr.
Lag time = 1.15 Min.
25% of lag time = 0.29 Min.
40% of lag time = 0.46 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

```
Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        3.86            2.69                  10.38

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        3.86            6.46                  24.94

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.690(In)
Area Averaged 100-Year Rainfall =    6.460(In)

Point rain (area averaged) =    2.690(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.690(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     3.860           69.00         0.260
 Total Area Entered =      3.86(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
69.0  49.8      0.574     0.260        0.440       1.000      0.440
                                                 Sum (F) =   0.440
Area averaged mean soil loss (F) (In/Hr) =  0.440
Minimum soil loss rate ((In/Hr)) =  0.220
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.692
------------------------------------------------------------------------

               U n i t  H y d r o g r a p h
                       VALLEY S-Curve
------------------------------------------------------------------------
               Unit Hydrograph Data
------------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %            (CFS)
------------------------------------------------------------------------
    1   0.083        434.891         67.345              2.620
    2   0.167        869.783         32.655              1.270
                              Sum = 100.000   Sum=       3.890
------------------------------------------------------------------------

 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value
```

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.022	(0.779)	0.015	0.007
2	0.17	0.07	0.022	(0.776)	0.015	0.007
3	0.25	0.07	0.022	(0.773)	0.015	0.007
4	0.33	0.10	0.032	(0.770)	0.022	0.010
5	0.42	0.10	0.032	(0.767)	0.022	0.010
6	0.50	0.10	0.032	(0.764)	0.022	0.010
7	0.58	0.10	0.032	(0.761)	0.022	0.010
8	0.67	0.10	0.032	(0.758)	0.022	0.010
9	0.75	0.10	0.032	(0.755)	0.022	0.010
10	0.83	0.13	0.043	(0.752)	0.030	0.013
11	0.92	0.13	0.043	(0.750)	0.030	0.013
12	1.00	0.13	0.043	(0.747)	0.030	0.013
13	1.08	0.10	0.032	(0.744)	0.022	0.010
14	1.17	0.10	0.032	(0.741)	0.022	0.010
15	1.25	0.10	0.032	(0.738)	0.022	0.010
16	1.33	0.10	0.032	(0.735)	0.022	0.010
17	1.42	0.10	0.032	(0.732)	0.022	0.010
18	1.50	0.10	0.032	(0.729)	0.022	0.010
19	1.58	0.10	0.032	(0.726)	0.022	0.010
20	1.67	0.10	0.032	(0.723)	0.022	0.010
21	1.75	0.10	0.032	(0.720)	0.022	0.010
22	1.83	0.13	0.043	(0.717)	0.030	0.013
23	1.92	0.13	0.043	(0.714)	0.030	0.013
24	2.00	0.13	0.043	(0.712)	0.030	0.013
25	2.08	0.13	0.043	(0.709)	0.030	0.013
26	2.17	0.13	0.043	(0.706)	0.030	0.013
27	2.25	0.13	0.043	(0.703)	0.030	0.013
28	2.33	0.13	0.043	(0.700)	0.030	0.013
29	2.42	0.13	0.043	(0.697)	0.030	0.013
30	2.50	0.13	0.043	(0.694)	0.030	0.013
31	2.58	0.17	0.054	(0.692)	0.037	0.017
32	2.67	0.17	0.054	(0.689)	0.037	0.017
33	2.75	0.17	0.054	(0.686)	0.037	0.017
34	2.83	0.17	0.054	(0.683)	0.037	0.017
35	2.92	0.17	0.054	(0.680)	0.037	0.017
36	3.00	0.17	0.054	(0.677)	0.037	0.017
37	3.08	0.17	0.054	(0.675)	0.037	0.017
38	3.17	0.17	0.054	(0.672)	0.037	0.017
39	3.25	0.17	0.054	(0.669)	0.037	0.017
40	3.33	0.17	0.054	(0.666)	0.037	0.017
41	3.42	0.17	0.054	(0.663)	0.037	0.017
42	3.50	0.17	0.054	(0.661)	0.037	0.017
43	3.58	0.17	0.054	(0.658)	0.037	0.017
44	3.67	0.17	0.054	(0.655)	0.037	0.017
45	3.75	0.17	0.054	(0.652)	0.037	0.017
46	3.83	0.20	0.065	(0.650)	0.045	0.020
47	3.92	0.20	0.065	(0.647)	0.045	0.020

48	4.00	0.20	0.065	(0.644)	0.045	0.020
49	4.08	0.20	0.065	(0.641)	0.045	0.020
50	4.17	0.20	0.065	(0.639)	0.045	0.020
51	4.25	0.20	0.065	(0.636)	0.045	0.020
52	4.33	0.23	0.075	(0.633)	0.052	0.023
53	4.42	0.23	0.075	(0.631)	0.052	0.023
54	4.50	0.23	0.075	(0.628)	0.052	0.023
55	4.58	0.23	0.075	(0.625)	0.052	0.023
56	4.67	0.23	0.075	(0.622)	0.052	0.023
57	4.75	0.23	0.075	(0.620)	0.052	0.023
58	4.83	0.27	0.086	(0.617)	0.060	0.027
59	4.92	0.27	0.086	(0.614)	0.060	0.027
60	5.00	0.27	0.086	(0.612)	0.060	0.027
61	5.08	0.20	0.065	(0.609)	0.045	0.020
62	5.17	0.20	0.065	(0.606)	0.045	0.020
63	5.25	0.20	0.065	(0.604)	0.045	0.020
64	5.33	0.23	0.075	(0.601)	0.052	0.023
65	5.42	0.23	0.075	(0.599)	0.052	0.023
66	5.50	0.23	0.075	(0.596)	0.052	0.023
67	5.58	0.27	0.086	(0.593)	0.060	0.027
68	5.67	0.27	0.086	(0.591)	0.060	0.027
69	5.75	0.27	0.086	(0.588)	0.060	0.027
70	5.83	0.27	0.086	(0.586)	0.060	0.027
71	5.92	0.27	0.086	(0.583)	0.060	0.027
72	6.00	0.27	0.086	(0.580)	0.060	0.027
73	6.08	0.30	0.097	(0.578)	0.067	0.030
74	6.17	0.30	0.097	(0.575)	0.067	0.030
75	6.25	0.30	0.097	(0.573)	0.067	0.030
76	6.33	0.30	0.097	(0.570)	0.067	0.030
77	6.42	0.30	0.097	(0.568)	0.067	0.030
78	6.50	0.30	0.097	(0.565)	0.067	0.030
79	6.58	0.33	0.108	(0.562)	0.074	0.033
80	6.67	0.33	0.108	(0.560)	0.074	0.033
81	6.75	0.33	0.108	(0.557)	0.074	0.033
82	6.83	0.33	0.108	(0.555)	0.074	0.033
83	6.92	0.33	0.108	(0.552)	0.074	0.033
84	7.00	0.33	0.108	(0.550)	0.074	0.033
85	7.08	0.33	0.108	(0.547)	0.074	0.033
86	7.17	0.33	0.108	(0.545)	0.074	0.033
87	7.25	0.33	0.108	(0.542)	0.074	0.033
88	7.33	0.37	0.118	(0.540)	0.082	0.036
89	7.42	0.37	0.118	(0.537)	0.082	0.036
90	7.50	0.37	0.118	(0.535)	0.082	0.036
91	7.58	0.40	0.129	(0.532)	0.089	0.040
92	7.67	0.40	0.129	(0.530)	0.089	0.040
93	7.75	0.40	0.129	(0.528)	0.089	0.040
94	7.83	0.43	0.140	(0.525)	0.097	0.043
95	7.92	0.43	0.140	(0.523)	0.097	0.043
96	8.00	0.43	0.140	(0.520)	0.097	0.043
97	8.08	0.50	0.161	(0.518)	0.112	0.050

98	8.17	0.50	0.161	(0.515)	0.112	0.050
99	8.25	0.50	0.161	(0.513)	0.112	0.050
100	8.33	0.50	0.161	(0.511)	0.112	0.050
101	8.42	0.50	0.161	(0.508)	0.112	0.050
102	8.50	0.50	0.161	(0.506)	0.112	0.050
103	8.58	0.53	0.172	(0.504)	0.119	0.053
104	8.67	0.53	0.172	(0.501)	0.119	0.053
105	8.75	0.53	0.172	(0.499)	0.119	0.053
106	8.83	0.57	0.183	(0.496)	0.127	0.056
107	8.92	0.57	0.183	(0.494)	0.127	0.056
108	9.00	0.57	0.183	(0.492)	0.127	0.056
109	9.08	0.63	0.204	(0.489)	0.141	0.063
110	9.17	0.63	0.204	(0.487)	0.141	0.063
111	9.25	0.63	0.204	(0.485)	0.141	0.063
112	9.33	0.67	0.215	(0.482)	0.149	0.066
113	9.42	0.67	0.215	(0.480)	0.149	0.066
114	9.50	0.67	0.215	(0.478)	0.149	0.066
115	9.58	0.70	0.226	(0.476)	0.156	0.070
116	9.67	0.70	0.226	(0.473)	0.156	0.070
117	9.75	0.70	0.226	(0.471)	0.156	0.070
118	9.83	0.73	0.237	(0.469)	0.164	0.073
119	9.92	0.73	0.237	(0.467)	0.164	0.073
120	10.00	0.73	0.237	(0.464)	0.164	0.073
121	10.08	0.50	0.161	(0.462)	0.112	0.050
122	10.17	0.50	0.161	(0.460)	0.112	0.050
123	10.25	0.50	0.161	(0.458)	0.112	0.050
124	10.33	0.50	0.161	(0.455)	0.112	0.050
125	10.42	0.50	0.161	(0.453)	0.112	0.050
126	10.50	0.50	0.161	(0.451)	0.112	0.050
127	10.58	0.67	0.215	(0.449)	0.149	0.066
128	10.67	0.67	0.215	(0.447)	0.149	0.066
129	10.75	0.67	0.215	(0.444)	0.149	0.066
130	10.83	0.67	0.215	(0.442)	0.149	0.066
131	10.92	0.67	0.215	(0.440)	0.149	0.066
132	11.00	0.67	0.215	(0.438)	0.149	0.066
133	11.08	0.63	0.204	(0.436)	0.141	0.063
134	11.17	0.63	0.204	(0.434)	0.141	0.063
135	11.25	0.63	0.204	(0.431)	0.141	0.063
136	11.33	0.63	0.204	(0.429)	0.141	0.063
137	11.42	0.63	0.204	(0.427)	0.141	0.063
138	11.50	0.63	0.204	(0.425)	0.141	0.063
139	11.58	0.57	0.183	(0.423)	0.127	0.056
140	11.67	0.57	0.183	(0.421)	0.127	0.056
141	11.75	0.57	0.183	(0.419)	0.127	0.056
142	11.83	0.60	0.194	(0.417)	0.134	0.060
143	11.92	0.60	0.194	(0.415)	0.134	0.060
144	12.00	0.60	0.194	(0.412)	0.134	0.060
145	12.08	0.83	0.269	(0.410)	0.186	0.083
146	12.17	0.83	0.269	(0.408)	0.186	0.083
147	12.25	0.83	0.269	(0.406)	0.186	0.083

148	12.33	0.87	0.280	(0.404)	0.194	0.086
149	12.42	0.87	0.280	(0.402)	0.194	0.086
150	12.50	0.87	0.280	(0.400)	0.194	0.086
151	12.58	0.93	0.301	(0.398)	0.208	0.093
152	12.67	0.93	0.301	(0.396)	0.208	0.093
153	12.75	0.93	0.301	(0.394)	0.208	0.093
154	12.83	0.97	0.312	(0.392)	0.216	0.096
155	12.92	0.97	0.312	(0.390)	0.216	0.096
156	13.00	0.97	0.312	(0.388)	0.216	0.096
157	13.08	1.13	0.366	(0.386)	0.253	0.113
158	13.17	1.13	0.366	(0.384)	0.253	0.113
159	13.25	1.13	0.366	(0.382)	0.253	0.113
160	13.33	1.13	0.366	(0.380)	0.253	0.113
161	13.42	1.13	0.366	(0.378)	0.253	0.113
162	13.50	1.13	0.366	(0.377)	0.253	0.113
163	13.58	0.77	0.247	(0.375)	0.171	0.076
164	13.67	0.77	0.247	(0.373)	0.171	0.076
165	13.75	0.77	0.247	(0.371)	0.171	0.076
166	13.83	0.77	0.247	(0.369)	0.171	0.076
167	13.92	0.77	0.247	(0.367)	0.171	0.076
168	14.00	0.77	0.247	(0.365)	0.171	0.076
169	14.08	0.90	0.291	(0.363)	0.201	0.089
170	14.17	0.90	0.291	(0.361)	0.201	0.089
171	14.25	0.90	0.291	(0.360)	0.201	0.089
172	14.33	0.87	0.280	(0.358)	0.194	0.086
173	14.42	0.87	0.280	(0.356)	0.194	0.086
174	14.50	0.87	0.280	(0.354)	0.194	0.086
175	14.58	0.87	0.280	(0.352)	0.194	0.086
176	14.67	0.87	0.280	(0.351)	0.194	0.086
177	14.75	0.87	0.280	(0.349)	0.194	0.086
178	14.83	0.83	0.269	(0.347)	0.186	0.083
179	14.92	0.83	0.269	(0.345)	0.186	0.083
180	15.00	0.83	0.269	(0.343)	0.186	0.083
181	15.08	0.80	0.258	(0.342)	0.179	0.080
182	15.17	0.80	0.258	(0.340)	0.179	0.080
183	15.25	0.80	0.258	(0.338)	0.179	0.080
184	15.33	0.77	0.247	(0.336)	0.171	0.076
185	15.42	0.77	0.247	(0.335)	0.171	0.076
186	15.50	0.77	0.247	(0.333)	0.171	0.076
187	15.58	0.63	0.204	(0.331)	0.141	0.063
188	15.67	0.63	0.204	(0.330)	0.141	0.063
189	15.75	0.63	0.204	(0.328)	0.141	0.063
190	15.83	0.63	0.204	(0.326)	0.141	0.063
191	15.92	0.63	0.204	(0.325)	0.141	0.063
192	16.00	0.63	0.204	(0.323)	0.141	0.063
193	16.08	0.13	0.043	(0.321)	0.030	0.013
194	16.17	0.13	0.043	(0.320)	0.030	0.013
195	16.25	0.13	0.043	(0.318)	0.030	0.013
196	16.33	0.13	0.043	(0.316)	0.030	0.013
197	16.42	0.13	0.043	(0.315)	0.030	0.013

198	16.50	0.13	0.043	(0.313)	0.030	0.013
199	16.58	0.10	0.032	(0.312)	0.022	0.010
200	16.67	0.10	0.032	(0.310)	0.022	0.010
201	16.75	0.10	0.032	(0.308)	0.022	0.010
202	16.83	0.10	0.032	(0.307)	0.022	0.010
203	16.92	0.10	0.032	(0.305)	0.022	0.010
204	17.00	0.10	0.032	(0.304)	0.022	0.010
205	17.08	0.17	0.054	(0.302)	0.037	0.017
206	17.17	0.17	0.054	(0.301)	0.037	0.017
207	17.25	0.17	0.054	(0.299)	0.037	0.017
208	17.33	0.17	0.054	(0.298)	0.037	0.017
209	17.42	0.17	0.054	(0.296)	0.037	0.017
210	17.50	0.17	0.054	(0.295)	0.037	0.017
211	17.58	0.17	0.054	(0.293)	0.037	0.017
212	17.67	0.17	0.054	(0.292)	0.037	0.017
213	17.75	0.17	0.054	(0.290)	0.037	0.017
214	17.83	0.13	0.043	(0.289)	0.030	0.013
215	17.92	0.13	0.043	(0.287)	0.030	0.013
216	18.00	0.13	0.043	(0.286)	0.030	0.013
217	18.08	0.13	0.043	(0.285)	0.030	0.013
218	18.17	0.13	0.043	(0.283)	0.030	0.013
219	18.25	0.13	0.043	(0.282)	0.030	0.013
220	18.33	0.13	0.043	(0.280)	0.030	0.013
221	18.42	0.13	0.043	(0.279)	0.030	0.013
222	18.50	0.13	0.043	(0.278)	0.030	0.013
223	18.58	0.10	0.032	(0.276)	0.022	0.010
224	18.67	0.10	0.032	(0.275)	0.022	0.010
225	18.75	0.10	0.032	(0.274)	0.022	0.010
226	18.83	0.07	0.022	(0.272)	0.015	0.007
227	18.92	0.07	0.022	(0.271)	0.015	0.007
228	19.00	0.07	0.022	(0.270)	0.015	0.007
229	19.08	0.10	0.032	(0.269)	0.022	0.010
230	19.17	0.10	0.032	(0.267)	0.022	0.010
231	19.25	0.10	0.032	(0.266)	0.022	0.010
232	19.33	0.13	0.043	(0.265)	0.030	0.013
233	19.42	0.13	0.043	(0.264)	0.030	0.013
234	19.50	0.13	0.043	(0.262)	0.030	0.013
235	19.58	0.10	0.032	(0.261)	0.022	0.010
236	19.67	0.10	0.032	(0.260)	0.022	0.010
237	19.75	0.10	0.032	(0.259)	0.022	0.010
238	19.83	0.07	0.022	(0.258)	0.015	0.007
239	19.92	0.07	0.022	(0.256)	0.015	0.007
240	20.00	0.07	0.022	(0.255)	0.015	0.007
241	20.08	0.10	0.032	(0.254)	0.022	0.010
242	20.17	0.10	0.032	(0.253)	0.022	0.010
243	20.25	0.10	0.032	(0.252)	0.022	0.010
244	20.33	0.10	0.032	(0.251)	0.022	0.010
245	20.42	0.10	0.032	(0.250)	0.022	0.010
246	20.50	0.10	0.032	(0.249)	0.022	0.010
247	20.58	0.10	0.032	(0.248)	0.022	0.010

248	20.67	0.10	0.032	(	0.247)	0.022	0.010
249	20.75	0.10	0.032	(	0.246)	0.022	0.010
250	20.83	0.07	0.022	(	0.245)	0.015	0.007
251	20.92	0.07	0.022	(	0.244)	0.015	0.007
252	21.00	0.07	0.022	(	0.243)	0.015	0.007
253	21.08	0.10	0.032	(	0.242)	0.022	0.010
254	21.17	0.10	0.032	(	0.241)	0.022	0.010
255	21.25	0.10	0.032	(	0.240)	0.022	0.010
256	21.33	0.07	0.022	(	0.239)	0.015	0.007
257	21.42	0.07	0.022	(	0.238)	0.015	0.007
258	21.50	0.07	0.022	(	0.237)	0.015	0.007
259	21.58	0.10	0.032	(	0.236)	0.022	0.010
260	21.67	0.10	0.032	(	0.235)	0.022	0.010
261	21.75	0.10	0.032	(	0.235)	0.022	0.010
262	21.83	0.07	0.022	(	0.234)	0.015	0.007
263	21.92	0.07	0.022	(	0.233)	0.015	0.007
264	22.00	0.07	0.022	(	0.232)	0.015	0.007
265	22.08	0.10	0.032	(	0.231)	0.022	0.010
266	22.17	0.10	0.032	(	0.231)	0.022	0.010
267	22.25	0.10	0.032	(	0.230)	0.022	0.010
268	22.33	0.07	0.022	(	0.229)	0.015	0.007
269	22.42	0.07	0.022	(	0.228)	0.015	0.007
270	22.50	0.07	0.022	(	0.228)	0.015	0.007
271	22.58	0.07	0.022	(	0.227)	0.015	0.007
272	22.67	0.07	0.022	(	0.226)	0.015	0.007
273	22.75	0.07	0.022	(	0.226)	0.015	0.007
274	22.83	0.07	0.022	(	0.225)	0.015	0.007
275	22.92	0.07	0.022	(	0.225)	0.015	0.007
276	23.00	0.07	0.022	(	0.224)	0.015	0.007
277	23.08	0.07	0.022	(	0.224)	0.015	0.007
278	23.17	0.07	0.022	(	0.223)	0.015	0.007
279	23.25	0.07	0.022	(	0.223)	0.015	0.007
280	23.33	0.07	0.022	(	0.222)	0.015	0.007
281	23.42	0.07	0.022	(	0.222)	0.015	0.007
282	23.50	0.07	0.022	(	0.221)	0.015	0.007
283	23.58	0.07	0.022	(	0.221)	0.015	0.007
284	23.67	0.07	0.022	(	0.221)	0.015	0.007
285	23.75	0.07	0.022	(	0.220)	0.015	0.007
286	23.83	0.07	0.022	(	0.220)	0.015	0.007
287	23.92	0.07	0.022	(	0.220)	0.015	0.007
288	24.00	0.07	0.022	(	0.220)	0.015	0.007

(Loss Rate Not Used)

Sum = 100.0 Sum = 9.9

Flood volume = Effective rainfall 0.83(In)
times area 3.9(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)
Total soil loss = 1.86(In)
Total soil loss = 0.599(Ac.Ft)
Total rainfall = 2.69(In)
Flood volume = 11609.0 Cubic Feet
Total soil loss = 26082.5 Cubic Feet

Peak flow rate of this hydrograph = 0.439(CFS)

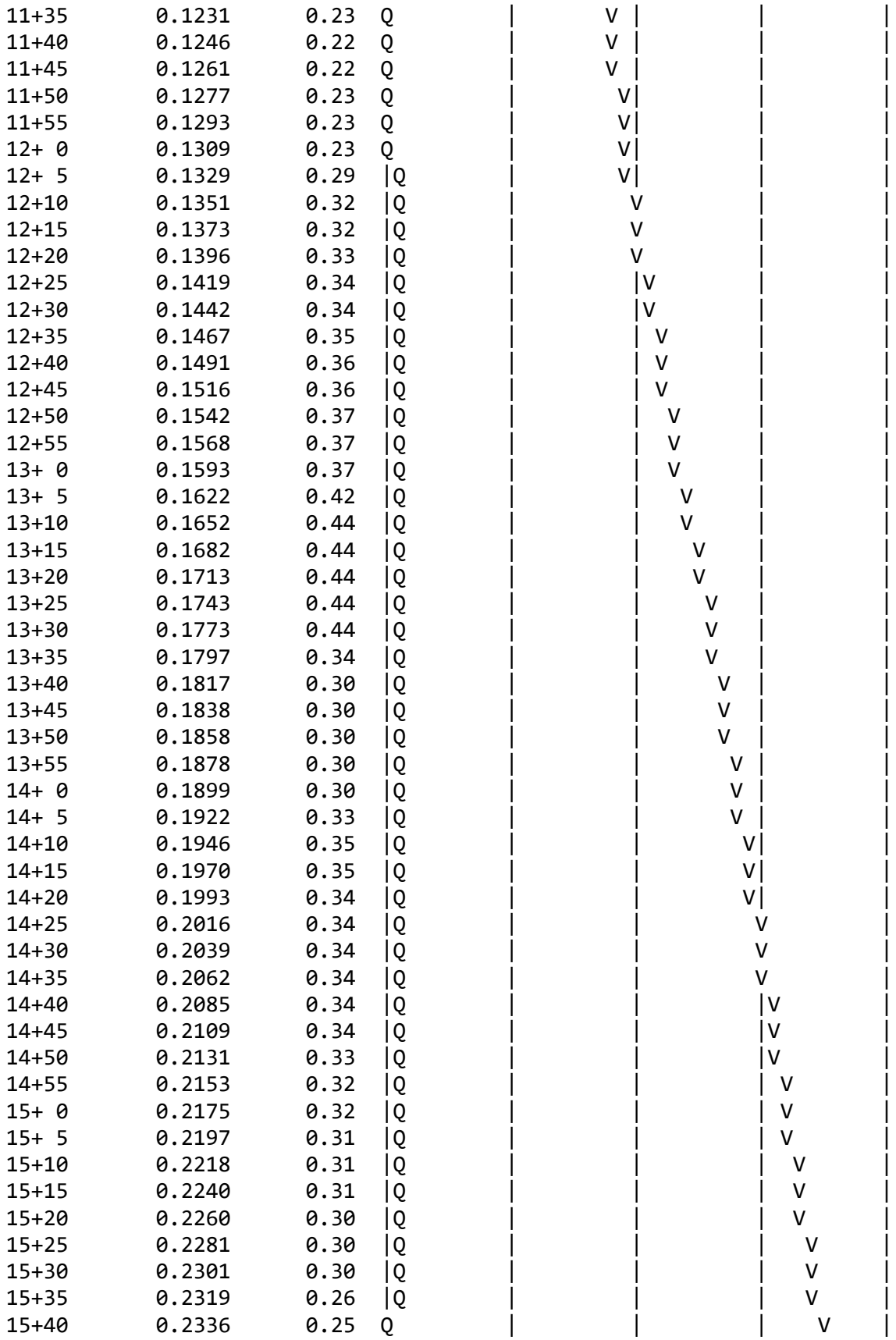
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.02	Q				
0+10	0.0003	0.03	Q				
0+15	0.0005	0.03	Q				
0+20	0.0007	0.03	Q				
0+25	0.0010	0.04	Q				
0+30	0.0012	0.04	Q				
0+35	0.0015	0.04	Q				
0+40	0.0018	0.04	Q				
0+45	0.0020	0.04	Q				
0+50	0.0024	0.05	Q				
0+55	0.0027	0.05	Q				
1+ 0	0.0031	0.05	Q				
1+ 5	0.0034	0.04	Q				
1+10	0.0036	0.04	Q				
1+15	0.0039	0.04	Q				
1+20	0.0042	0.04	Q				
1+25	0.0044	0.04	Q				
1+30	0.0047	0.04	Q				
1+35	0.0050	0.04	Q				
1+40	0.0052	0.04	Q				
1+45	0.0055	0.04	Q				
1+50	0.0058	0.05	Q				
1+55	0.0062	0.05	Q				
2+ 0	0.0065	0.05	Q				
2+ 5	0.0069	0.05	QV				
2+10	0.0073	0.05	QV				
2+15	0.0076	0.05	QV				
2+20	0.0080	0.05	QV				
2+25	0.0083	0.05	QV				
2+30	0.0087	0.05	QV				
2+35	0.0091	0.06	QV				
2+40	0.0095	0.06	QV				
2+45	0.0100	0.06	QV				
2+50	0.0104	0.06	QV				
2+55	0.0109	0.06	QV				
3+ 0	0.0113	0.06	QV				
3+ 5	0.0118	0.06	QV				
3+10	0.0122	0.06	QV				

3+15	0.0126	0.06	QV	|	|	|	|
3+20	0.0131	0.06	QV	|	|	|	|
3+25	0.0135	0.06	Q V	|	|	|	|
3+30	0.0140	0.06	Q V	|	|	|	|
3+35	0.0144	0.06	Q V	|	|	|	|
3+40	0.0149	0.06	Q V	|	|	|	|
3+45	0.0153	0.06	Q V	|	|	|	|
3+50	0.0158	0.07	Q V	|	|	|	|
3+55	0.0163	0.08	Q V	|	|	|	|
4+ 0	0.0169	0.08	Q V	|	|	|	|
4+ 5	0.0174	0.08	Q V	|	|	|	|
4+10	0.0179	0.08	Q V	|	|	|	|
4+15	0.0185	0.08	Q V	|	|	|	|
4+20	0.0191	0.09	Q V	|	|	|	|
4+25	0.0197	0.09	Q V	|	|	|	|
4+30	0.0203	0.09	Q V	|	|	|	|
4+35	0.0209	0.09	Q V	|	|	|	|
4+40	0.0216	0.09	Q V	|	|	|	|
4+45	0.0222	0.09	Q V	|	|	|	|
4+50	0.0229	0.10	Q V	|	|	|	|
4+55	0.0236	0.10	Q V	|	|	|	|
5+ 0	0.0243	0.10	Q V	|	|	|	|
5+ 5	0.0249	0.09	Q V	|	|	|	|
5+10	0.0254	0.08	Q V	|	|	|	|
5+15	0.0259	0.08	Q V	|	|	|	|
5+20	0.0265	0.09	Q V	|	|	|	|
5+25	0.0272	0.09	Q V	|	|	|	|
5+30	0.0278	0.09	Q V	|	|	|	|
5+35	0.0285	0.10	Q V	|	|	|	|
5+40	0.0292	0.10	Q V	|	|	|	|
5+45	0.0299	0.10	Q V	|	|	|	|
5+50	0.0306	0.10	Q V	|	|	|	|
5+55	0.0313	0.10	Q V	|	|	|	|
6+ 0	0.0320	0.10	Q V	|	|	|	|
6+ 5	0.0328	0.11	Q V	|	|	|	|
6+10	0.0336	0.12	Q V	|	|	|	|
6+15	0.0344	0.12	Q V	|	|	|	|
6+20	0.0352	0.12	Q V	|	|	|	|
6+25	0.0360	0.12	Q V	|	|	|	|
6+30	0.0368	0.12	Q V	|	|	|	|
6+35	0.0376	0.12	Q V	|	|	|	|
6+40	0.0385	0.13	Q V	|	|	|	|
6+45	0.0394	0.13	Q V	|	|	|	|
6+50	0.0403	0.13	Q V	|	|	|	|
6+55	0.0412	0.13	Q V	|	|	|	|
7+ 0	0.0421	0.13	Q V	|	|	|	|
7+ 5	0.0430	0.13	Q V	|	|	|	|
7+10	0.0439	0.13	Q V	|	|	|	|
7+15	0.0447	0.13	Q V	|	|	|	|
7+20	0.0457	0.14	Q V	|	|	|	|

```
 7+25       0.0467      0.14  Q      V  |          |          |          |
 7+30       0.0477      0.14  Q      V  |          |          |          |
 7+35       0.0487      0.15  Q      V  |          |          |          |
 7+40       0.0498      0.15  Q      V  |          |          |          |
 7+45       0.0508      0.15  Q      V  |          |          |          |
 7+50       0.0519      0.16  Q      V  |          |          |          |
 7+55       0.0531      0.17  Q      V  |          |          |          |
 8+ 0       0.0543      0.17  Q       V |          |          |          |
 8+ 5       0.0555      0.19  Q       V |          |          |          |
 8+10       0.0569      0.19  Q       V |          |          |          |
 8+15       0.0582      0.19  Q       V |          |          |          |
 8+20       0.0595      0.19  Q       V |          |          |          |
 8+25       0.0609      0.19  Q        V|          |          |          |
 8+30       0.0622      0.19  Q        V|          |          |          |
 8+35       0.0636      0.20  Q        V|          |          |          |
 8+40       0.0650      0.21  Q        V|          |          |          |
 8+45       0.0664      0.21  Q        V|          |          |          |
 8+50       0.0679      0.22  Q         V          |          |          |
 8+55       0.0694      0.22  Q         V          |          |          |
 9+ 0       0.0709      0.22  Q         V          |          |          |
 9+ 5       0.0726      0.24  Q         V          |          |          |
 9+10       0.0742      0.25  Q         |V         |          |          |
 9+15       0.0759      0.25  Q         |V         |          |          |
 9+20       0.0777      0.25  |Q        |V         |          |          |
 9+25       0.0795      0.26  |Q        |V         |          |          |
 9+30       0.0812      0.26  |Q        | V        |          |          |
 9+35       0.0831      0.27  |Q        | V        |          |          |
 9+40       0.0849      0.27  |Q        | V        |          |          |
 9+45       0.0868      0.27  |Q        |  V       |          |          |
 9+50       0.0887      0.28  |Q        |  V       |          |          |
 9+55       0.0907      0.28  |Q        |  V       |          |          |
10+ 0       0.0926      0.28  |Q        |  V       |          |          |
10+ 5       0.0942      0.22  Q         |   V      |          |          |
10+10       0.0955      0.19  Q         |   V      |          |          |
10+15       0.0968      0.19  Q         |   V      |          |          |
10+20       0.0982      0.19  Q         |   V      |          |          |
10+25       0.0995      0.19  Q         |   V      |          |          |
10+30       0.1008      0.19  Q         |    V     |          |          |
10+35       0.1025      0.24  Q         |    V     |          |          |
10+40       0.1042      0.26  |Q        |    V     |          |          |
10+45       0.1060      0.26  |Q        |    V     |          |          |
10+50       0.1078      0.26  |Q        |     V    |          |          |
10+55       0.1096      0.26  |Q        |     V    |          |          |
11+ 0       0.1114      0.26  |Q        |     V    |          |          |
11+ 5       0.1131      0.25  Q         |     V    |          |          |
11+10       0.1148      0.25  Q         |      V   |          |          |
11+15       0.1164      0.25  Q         |      V   |          |          |
11+20       0.1181      0.25  Q         |      V   |          |          |
11+25       0.1198      0.25  Q         |      V   |          |          |
11+30       0.1215      0.25  Q         |       V  |          |          |
```


11+35 0.1231 0.23 Q
11+40 0.1246 0.22 Q
11+45 0.1261 0.22 Q
11+50 0.1277 0.23 Q
11+55 0.1293 0.23 Q
12+ 0 0.1309 0.23 Q
12+ 5 0.1329 0.29 Q
12+10 0.1351 0.32 Q
12+15 0.1373 0.32 Q
12+20 0.1396 0.33 Q
12+25 0.1419 0.34 Q
12+30 0.1442 0.34 Q
12+35 0.1467 0.35 Q
12+40 0.1491 0.36 Q
12+45 0.1516 0.36 Q
12+50 0.1542 0.37 Q
12+55 0.1568 0.37 Q
13+ 0 0.1593 0.37 Q
13+ 5 0.1622 0.42 Q
13+10 0.1652 0.44 Q
13+15 0.1682 0.44 Q
13+20 0.1713 0.44 Q
13+25 0.1743 0.44 Q
13+30 0.1773 0.44 Q
13+35 0.1797 0.34 Q
13+40 0.1817 0.30 Q
13+45 0.1838 0.30 Q
13+50 0.1858 0.30 Q
13+55 0.1878 0.30 Q
14+ 0 0.1899 0.30 Q
14+ 5 0.1922 0.33 Q
14+10 0.1946 0.35 Q
14+15 0.1970 0.35 Q
14+20 0.1993 0.34 Q
14+25 0.2016 0.34 Q
14+30 0.2039 0.34 Q
14+35 0.2062 0.34 Q
14+40 0.2085 0.34 Q
14+45 0.2109 0.34 Q
14+50 0.2131 0.33 Q
14+55 0.2153 0.32 Q
15+ 0 0.2175 0.32 Q
15+ 5 0.2197 0.31 Q
15+10 0.2218 0.31 Q
15+15 0.2240 0.31 Q
15+20 0.2260 0.30 Q
15+25 0.2281 0.30 Q
15+30 0.2301 0.30 Q
15+35 0.2319 0.26 Q
15+40 0.2336 0.25 Q

15+45	0.2353	0.25	Q	|	|	|	V |
15+50	0.2370	0.25	Q	|	|	|	V |
15+55	0.2387	0.25	Q	|	|	|	V |
16+ 0	0.2404	0.25	Q	|	|	|	V |
16+ 5	0.2412	0.11	Q	|	|	|	V |
16+10	0.2415	0.05	Q	|	|	|	V |
16+15	0.2419	0.05	Q	|	|	|	V |
16+20	0.2422	0.05	Q	|	|	|	V |
16+25	0.2426	0.05	Q	|	|	|	V |
16+30	0.2429	0.05	Q	|	|	|	V |
16+35	0.2432	0.04	Q	|	|	|	V |
16+40	0.2435	0.04	Q	|	|	|	V |
16+45	0.2438	0.04	Q	|	|	|	V |
16+50	0.2440	0.04	Q	|	|	|	V |
16+55	0.2443	0.04	Q	|	|	|	V |
17+ 0	0.2446	0.04	Q	|	|	|	V |
17+ 5	0.2450	0.06	Q	|	|	|	V |
17+10	0.2454	0.06	Q	|	|	|	V |
17+15	0.2458	0.06	Q	|	|	|	V |
17+20	0.2463	0.06	Q	|	|	|	V |
17+25	0.2467	0.06	Q	|	|	|	V |
17+30	0.2472	0.06	Q	|	|	|	V |
17+35	0.2476	0.06	Q	|	|	|	V |
17+40	0.2481	0.06	Q	|	|	|	V |
17+45	0.2485	0.06	Q	|	|	|	V |
17+50	0.2489	0.06	Q	|	|	|	V |
17+55	0.2492	0.05	Q	|	|	|	V |
18+ 0	0.2496	0.05	Q	|	|	|	V |
18+ 5	0.2500	0.05	Q	|	|	|	V |
18+10	0.2503	0.05	Q	|	|	|	V |
18+15	0.2507	0.05	Q	|	|	|	V |
18+20	0.2510	0.05	Q	|	|	|	V |
18+25	0.2514	0.05	Q	|	|	|	V |
18+30	0.2517	0.05	Q	|	|	|	V |
18+35	0.2520	0.04	Q	|	|	|	V |
18+40	0.2523	0.04	Q	|	|	|	V |
18+45	0.2526	0.04	Q	|	|	|	V |
18+50	0.2528	0.03	Q	|	|	|	V |
18+55	0.2529	0.03	Q	|	|	|	V |
19+ 0	0.2531	0.03	Q	|	|	|	V |
19+ 5	0.2534	0.03	Q	|	|	|	V |
19+10	0.2536	0.04	Q	|	|	|	V |
19+15	0.2539	0.04	Q	|	|	|	V |
19+20	0.2542	0.05	Q	|	|	|	V |
19+25	0.2546	0.05	Q	|	|	|	V |
19+30	0.2549	0.05	Q	|	|	|	V |
19+35	0.2552	0.04	Q	|	|	|	V |
19+40	0.2555	0.04	Q	|	|	|	V |
19+45	0.2558	0.04	Q	|	|	|	V |
19+50	0.2560	0.03	Q	|	|	|	V |

19+55	0.2561	0.03	Q	|	|	|	V |
20+ 0	0.2563	0.03	Q	|	|	|	V |
20+ 5	0.2566	0.03	Q	|	|	|	V |
20+10	0.2568	0.04	Q	|	|	|	V |
20+15	0.2571	0.04	Q	|	|	|	V |
20+20	0.2574	0.04	Q	|	|	|	V |
20+25	0.2576	0.04	Q	|	|	|	V |
20+30	0.2579	0.04	Q	|	|	|	V |
20+35	0.2582	0.04	Q	|	|	|	V |
20+40	0.2584	0.04	Q	|	|	|	V |
20+45	0.2587	0.04	Q	|	|	|	V |
20+50	0.2589	0.03	Q	|	|	|	V |
20+55	0.2591	0.03	Q	|	|	|	V |
21+ 0	0.2593	0.03	Q	|	|	|	V |
21+ 5	0.2595	0.03	Q	|	|	|	V |
21+10	0.2598	0.04	Q	|	|	|	V |
21+15	0.2600	0.04	Q	|	|	|	V|
21+20	0.2602	0.03	Q	|	|	|	V|
21+25	0.2604	0.03	Q	|	|	|	V|
21+30	0.2606	0.03	Q	|	|	|	V|
21+35	0.2608	0.03	Q	|	|	|	V|
21+40	0.2611	0.04	Q	|	|	|	V|
21+45	0.2614	0.04	Q	|	|	|	V|
21+50	0.2616	0.03	Q	|	|	|	V|
21+55	0.2617	0.03	Q	|	|	|	V|
22+ 0	0.2619	0.03	Q	|	|	|	V|
22+ 5	0.2622	0.03	Q	|	|	|	V|
22+10	0.2624	0.04	Q	|	|	|	V|
22+15	0.2627	0.04	Q	|	|	|	V|
22+20	0.2629	0.03	Q	|	|	|	V|
22+25	0.2631	0.03	Q	|	|	|	V|
22+30	0.2632	0.03	Q	|	|	|	V|
22+35	0.2634	0.03	Q	|	|	|	V|
22+40	0.2636	0.03	Q	|	|	|	V|
22+45	0.2638	0.03	Q	|	|	|	V|
22+50	0.2640	0.03	Q	|	|	|	V|
22+55	0.2641	0.03	Q	|	|	|	V|
23+ 0	0.2643	0.03	Q	|	|	|	V|
23+ 5	0.2645	0.03	Q	|	|	|	V|
23+10	0.2647	0.03	Q	|	|	|	V|
23+15	0.2648	0.03	Q	|	|	|	V|
23+20	0.2650	0.03	Q	|	|	|	V|
23+25	0.2652	0.03	Q	|	|	|	V|
23+30	0.2654	0.03	Q	|	|	|	V|
23+35	0.2656	0.03	Q	|	|	|	V|
23+40	0.2657	0.03	Q	|	|	|	V|
23+45	0.2659	0.03	Q	|	|	|	V|
23+50	0.2661	0.03	Q	|	|	|	V|
23+55	0.2663	0.03	Q	|	|	|	V|
24+ 0	0.2664	0.03	Q	|	|	|	V|

```
   24+ 5       0.2665      0.01  Q         |         |         |         V
-----------------------------------------------------------------------------
```

U n i t H y d r o g r a p h A n a l y s i s

Study date 08/18/22 File: 164postuh242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6481

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

---

202 E. Thirs Street
Post Development UH
2 yr
24 hr

Drainage Area = 3.86(Ac.) = 0.006 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 3.86(Ac.) = 0.006 Sq. Mi.
Length along longest watercourse = 341.00(Ft.)
Length along longest watercourse measured to centroid = 238.00(Ft.)
Length along longest watercourse = 0.065 Mi.
Length along longest watercourse measured to centroid = 0.045 Mi.
Difference in elevation = 12.60(Ft.)
Slope along watercourse = 195.0968 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.014 Hr.
Lag time = 0.86 Min.
25% of lag time = 0.22 Min.
40% of lag time = 0.34 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

```
Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        3.86            2.69                  10.38

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        3.86            6.46                  24.94

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.690(In)
Area Averaged 100-Year Rainfall =    6.460(In)

Point rain (area averaged) =    2.690(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.690(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     3.860           69.00         0.450
 Total Area Entered =      3.86(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
69.0  49.8      0.574     0.450        0.342       1.000      0.342
                                                 Sum (F) =   0.342
Area averaged mean soil loss (F) (In/Hr) =  0.342
Minimum soil loss rate ((In/Hr)) =  0.171
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.544
------------------------------------------------------------------------

               U n i t  H y d r o g r a p h
                       VALLEY S-Curve
------------------------------------------------------------------------
               Unit Hydrograph Data
------------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %           (CFS)
------------------------------------------------------------------------
    1   0.083        579.855         74.467             2.897
    2   0.167       1159.711         25.533             0.993
                               Sum = 100.000   Sum=       3.890
------------------------------------------------------------------------

 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value
```

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.022	(0.605)	0.012	0.010
2	0.17	0.07	0.022	(0.603)	0.012	0.010
3	0.25	0.07	0.022	(0.601)	0.012	0.010
4	0.33	0.10	0.032	(0.598)	0.018	0.015
5	0.42	0.10	0.032	(0.596)	0.018	0.015
6	0.50	0.10	0.032	(0.594)	0.018	0.015
7	0.58	0.10	0.032	(0.591)	0.018	0.015
8	0.67	0.10	0.032	(0.589)	0.018	0.015
9	0.75	0.10	0.032	(0.587)	0.018	0.015
10	0.83	0.13	0.043	(0.584)	0.023	0.020
11	0.92	0.13	0.043	(0.582)	0.023	0.020
12	1.00	0.13	0.043	(0.580)	0.023	0.020
13	1.08	0.10	0.032	(0.578)	0.018	0.015
14	1.17	0.10	0.032	(0.575)	0.018	0.015
15	1.25	0.10	0.032	(0.573)	0.018	0.015
16	1.33	0.10	0.032	(0.571)	0.018	0.015
17	1.42	0.10	0.032	(0.568)	0.018	0.015
18	1.50	0.10	0.032	(0.566)	0.018	0.015
19	1.58	0.10	0.032	(0.564)	0.018	0.015
20	1.67	0.10	0.032	(0.562)	0.018	0.015
21	1.75	0.10	0.032	(0.559)	0.018	0.015
22	1.83	0.13	0.043	(0.557)	0.023	0.020
23	1.92	0.13	0.043	(0.555)	0.023	0.020
24	2.00	0.13	0.043	(0.553)	0.023	0.020
25	2.08	0.13	0.043	(0.550)	0.023	0.020
26	2.17	0.13	0.043	(0.548)	0.023	0.020
27	2.25	0.13	0.043	(0.546)	0.023	0.020
28	2.33	0.13	0.043	(0.544)	0.023	0.020
29	2.42	0.13	0.043	(0.542)	0.023	0.020
30	2.50	0.13	0.043	(0.539)	0.023	0.020
31	2.58	0.17	0.054	(0.537)	0.029	0.025
32	2.67	0.17	0.054	(0.535)	0.029	0.025
33	2.75	0.17	0.054	(0.533)	0.029	0.025
34	2.83	0.17	0.054	(0.531)	0.029	0.025
35	2.92	0.17	0.054	(0.528)	0.029	0.025
36	3.00	0.17	0.054	(0.526)	0.029	0.025
37	3.08	0.17	0.054	(0.524)	0.029	0.025
38	3.17	0.17	0.054	(0.522)	0.029	0.025
39	3.25	0.17	0.054	(0.520)	0.029	0.025
40	3.33	0.17	0.054	(0.517)	0.029	0.025
41	3.42	0.17	0.054	(0.515)	0.029	0.025
42	3.50	0.17	0.054	(0.513)	0.029	0.025
43	3.58	0.17	0.054	(0.511)	0.029	0.025
44	3.67	0.17	0.054	(0.509)	0.029	0.025
45	3.75	0.17	0.054	(0.507)	0.029	0.025
46	3.83	0.20	0.065	(0.505)	0.035	0.029
47	3.92	0.20	0.065	(0.502)	0.035	0.029

48	4.00	0.20	0.065	(0.500)	0.035	0.029
49	4.08	0.20	0.065	(0.498)	0.035	0.029
50	4.17	0.20	0.065	(0.496)	0.035	0.029
51	4.25	0.20	0.065	(0.494)	0.035	0.029
52	4.33	0.23	0.075	(0.492)	0.041	0.034
53	4.42	0.23	0.075	(0.490)	0.041	0.034
54	4.50	0.23	0.075	(0.488)	0.041	0.034
55	4.58	0.23	0.075	(0.486)	0.041	0.034
56	4.67	0.23	0.075	(0.484)	0.041	0.034
57	4.75	0.23	0.075	(0.481)	0.041	0.034
58	4.83	0.27	0.086	(0.479)	0.047	0.039
59	4.92	0.27	0.086	(0.477)	0.047	0.039
60	5.00	0.27	0.086	(0.475)	0.047	0.039
61	5.08	0.20	0.065	(0.473)	0.035	0.029
62	5.17	0.20	0.065	(0.471)	0.035	0.029
63	5.25	0.20	0.065	(0.469)	0.035	0.029
64	5.33	0.23	0.075	(0.467)	0.041	0.034
65	5.42	0.23	0.075	(0.465)	0.041	0.034
66	5.50	0.23	0.075	(0.463)	0.041	0.034
67	5.58	0.27	0.086	(0.461)	0.047	0.039
68	5.67	0.27	0.086	(0.459)	0.047	0.039
69	5.75	0.27	0.086	(0.457)	0.047	0.039
70	5.83	0.27	0.086	(0.455)	0.047	0.039
71	5.92	0.27	0.086	(0.453)	0.047	0.039
72	6.00	0.27	0.086	(0.451)	0.047	0.039
73	6.08	0.30	0.097	(0.449)	0.053	0.044
74	6.17	0.30	0.097	(0.447)	0.053	0.044
75	6.25	0.30	0.097	(0.445)	0.053	0.044
76	6.33	0.30	0.097	(0.443)	0.053	0.044
77	6.42	0.30	0.097	(0.441)	0.053	0.044
78	6.50	0.30	0.097	(0.439)	0.053	0.044
79	6.58	0.33	0.108	(0.437)	0.059	0.049
80	6.67	0.33	0.108	(0.435)	0.059	0.049
81	6.75	0.33	0.108	(0.433)	0.059	0.049
82	6.83	0.33	0.108	(0.431)	0.059	0.049
83	6.92	0.33	0.108	(0.429)	0.059	0.049
84	7.00	0.33	0.108	(0.427)	0.059	0.049
85	7.08	0.33	0.108	(0.425)	0.059	0.049
86	7.17	0.33	0.108	(0.423)	0.059	0.049
87	7.25	0.33	0.108	(0.421)	0.059	0.049
88	7.33	0.37	0.118	(0.419)	0.064	0.054
89	7.42	0.37	0.118	(0.417)	0.064	0.054
90	7.50	0.37	0.118	(0.416)	0.064	0.054
91	7.58	0.40	0.129	(0.414)	0.070	0.059
92	7.67	0.40	0.129	(0.412)	0.070	0.059
93	7.75	0.40	0.129	(0.410)	0.070	0.059
94	7.83	0.43	0.140	(0.408)	0.076	0.064
95	7.92	0.43	0.140	(0.406)	0.076	0.064
96	8.00	0.43	0.140	(0.404)	0.076	0.064
97	8.08	0.50	0.161	(0.402)	0.088	0.074

98	8.17	0.50	0.161	(0.400)	0.088	0.074
99	8.25	0.50	0.161	(0.399)	0.088	0.074
100	8.33	0.50	0.161	(0.397)	0.088	0.074
101	8.42	0.50	0.161	(0.395)	0.088	0.074
102	8.50	0.50	0.161	(0.393)	0.088	0.074
103	8.58	0.53	0.172	(0.391)	0.094	0.079
104	8.67	0.53	0.172	(0.389)	0.094	0.079
105	8.75	0.53	0.172	(0.387)	0.094	0.079
106	8.83	0.57	0.183	(0.386)	0.100	0.083
107	8.92	0.57	0.183	(0.384)	0.100	0.083
108	9.00	0.57	0.183	(0.382)	0.100	0.083
109	9.08	0.63	0.204	(0.380)	0.111	0.093
110	9.17	0.63	0.204	(0.378)	0.111	0.093
111	9.25	0.63	0.204	(0.377)	0.111	0.093
112	9.33	0.67	0.215	(0.375)	0.117	0.098
113	9.42	0.67	0.215	(0.373)	0.117	0.098
114	9.50	0.67	0.215	(0.371)	0.117	0.098
115	9.58	0.70	0.226	(0.369)	0.123	0.103
116	9.67	0.70	0.226	(0.368)	0.123	0.103
117	9.75	0.70	0.226	(0.366)	0.123	0.103
118	9.83	0.73	0.237	(0.364)	0.129	0.108
119	9.92	0.73	0.237	(0.362)	0.129	0.108
120	10.00	0.73	0.237	(0.361)	0.129	0.108
121	10.08	0.50	0.161	(0.359)	0.088	0.074
122	10.17	0.50	0.161	(0.357)	0.088	0.074
123	10.25	0.50	0.161	(0.355)	0.088	0.074
124	10.33	0.50	0.161	(0.354)	0.088	0.074
125	10.42	0.50	0.161	(0.352)	0.088	0.074
126	10.50	0.50	0.161	(0.350)	0.088	0.074
127	10.58	0.67	0.215	(0.349)	0.117	0.098
128	10.67	0.67	0.215	(0.347)	0.117	0.098
129	10.75	0.67	0.215	(0.345)	0.117	0.098
130	10.83	0.67	0.215	(0.343)	0.117	0.098
131	10.92	0.67	0.215	(0.342)	0.117	0.098
132	11.00	0.67	0.215	(0.340)	0.117	0.098
133	11.08	0.63	0.204	(0.338)	0.111	0.093
134	11.17	0.63	0.204	(0.337)	0.111	0.093
135	11.25	0.63	0.204	(0.335)	0.111	0.093
136	11.33	0.63	0.204	(0.333)	0.111	0.093
137	11.42	0.63	0.204	(0.332)	0.111	0.093
138	11.50	0.63	0.204	(0.330)	0.111	0.093
139	11.58	0.57	0.183	(0.328)	0.100	0.083
140	11.67	0.57	0.183	(0.327)	0.100	0.083
141	11.75	0.57	0.183	(0.325)	0.100	0.083
142	11.83	0.60	0.194	(0.324)	0.105	0.088
143	11.92	0.60	0.194	(0.322)	0.105	0.088
144	12.00	0.60	0.194	(0.320)	0.105	0.088
145	12.08	0.83	0.269	(0.319)	0.146	0.123
146	12.17	0.83	0.269	(0.317)	0.146	0.123
147	12.25	0.83	0.269	(0.316)	0.146	0.123

148	12.33	0.87	0.280	(0.314)	0.152	0.128
149	12.42	0.87	0.280	(0.312)	0.152	0.128
150	12.50	0.87	0.280	(0.311)	0.152	0.128
151	12.58	0.93	0.301	(0.309)	0.164	0.137
152	12.67	0.93	0.301	(0.308)	0.164	0.137
153	12.75	0.93	0.301	(0.306)	0.164	0.137
154	12.83	0.97	0.312	(0.305)	0.170	0.142
155	12.92	0.97	0.312	(0.303)	0.170	0.142
156	13.00	0.97	0.312	(0.302)	0.170	0.142
157	13.08	1.13	0.366	(0.300)	0.199	0.167
158	13.17	1.13	0.366	(0.299)	0.199	0.167
159	13.25	1.13	0.366	(0.297)	0.199	0.167
160	13.33	1.13	0.366	(0.296)	0.199	0.167
161	13.42	1.13	0.366	(0.294)	0.199	0.167
162	13.50	1.13	0.366	(0.293)	0.199	0.167
163	13.58	0.77	0.247	(0.291)	0.135	0.113
164	13.67	0.77	0.247	(0.290)	0.135	0.113
165	13.75	0.77	0.247	(0.288)	0.135	0.113
166	13.83	0.77	0.247	(0.287)	0.135	0.113
167	13.92	0.77	0.247	(0.285)	0.135	0.113
168	14.00	0.77	0.247	(0.284)	0.135	0.113
169	14.08	0.90	0.291	(0.282)	0.158	0.132
170	14.17	0.90	0.291	(0.281)	0.158	0.132
171	14.25	0.90	0.291	(0.279)	0.158	0.132
172	14.33	0.87	0.280	(0.278)	0.152	0.128
173	14.42	0.87	0.280	(0.276)	0.152	0.128
174	14.50	0.87	0.280	(0.275)	0.152	0.128
175	14.58	0.87	0.280	(0.274)	0.152	0.128
176	14.67	0.87	0.280	(0.272)	0.152	0.128
177	14.75	0.87	0.280	(0.271)	0.152	0.128
178	14.83	0.83	0.269	(0.269)	0.146	0.123
179	14.92	0.83	0.269	(0.268)	0.146	0.123
180	15.00	0.83	0.269	(0.267)	0.146	0.123
181	15.08	0.80	0.258	(0.265)	0.140	0.118
182	15.17	0.80	0.258	(0.264)	0.140	0.118
183	15.25	0.80	0.258	(0.263)	0.140	0.118
184	15.33	0.77	0.247	(0.261)	0.135	0.113
185	15.42	0.77	0.247	(0.260)	0.135	0.113
186	15.50	0.77	0.247	(0.259)	0.135	0.113
187	15.58	0.63	0.204	(0.257)	0.111	0.093
188	15.67	0.63	0.204	(0.256)	0.111	0.093
189	15.75	0.63	0.204	(0.255)	0.111	0.093
190	15.83	0.63	0.204	(0.253)	0.111	0.093
191	15.92	0.63	0.204	(0.252)	0.111	0.093
192	16.00	0.63	0.204	(0.251)	0.111	0.093
193	16.08	0.13	0.043	(0.250)	0.023	0.020
194	16.17	0.13	0.043	(0.248)	0.023	0.020
195	16.25	0.13	0.043	(0.247)	0.023	0.020
196	16.33	0.13	0.043	(0.246)	0.023	0.020
197	16.42	0.13	0.043	(0.244)	0.023	0.020

198	16.50	0.13	0.043	(0.243)	0.023	0.020
199	16.58	0.10	0.032	(0.242)	0.018	0.015
200	16.67	0.10	0.032	(0.241)	0.018	0.015
201	16.75	0.10	0.032	(0.240)	0.018	0.015
202	16.83	0.10	0.032	(0.238)	0.018	0.015
203	16.92	0.10	0.032	(0.237)	0.018	0.015
204	17.00	0.10	0.032	(0.236)	0.018	0.015
205	17.08	0.17	0.054	(0.235)	0.029	0.025
206	17.17	0.17	0.054	(0.234)	0.029	0.025
207	17.25	0.17	0.054	(0.232)	0.029	0.025
208	17.33	0.17	0.054	(0.231)	0.029	0.025
209	17.42	0.17	0.054	(0.230)	0.029	0.025
210	17.50	0.17	0.054	(0.229)	0.029	0.025
211	17.58	0.17	0.054	(0.228)	0.029	0.025
212	17.67	0.17	0.054	(0.227)	0.029	0.025
213	17.75	0.17	0.054	(0.225)	0.029	0.025
214	17.83	0.13	0.043	(0.224)	0.023	0.020
215	17.92	0.13	0.043	(0.223)	0.023	0.020
216	18.00	0.13	0.043	(0.222)	0.023	0.020
217	18.08	0.13	0.043	(0.221)	0.023	0.020
218	18.17	0.13	0.043	(0.220)	0.023	0.020
219	18.25	0.13	0.043	(0.219)	0.023	0.020
220	18.33	0.13	0.043	(0.218)	0.023	0.020
221	18.42	0.13	0.043	(0.217)	0.023	0.020
222	18.50	0.13	0.043	(0.216)	0.023	0.020
223	18.58	0.10	0.032	(0.215)	0.018	0.015
224	18.67	0.10	0.032	(0.214)	0.018	0.015
225	18.75	0.10	0.032	(0.213)	0.018	0.015
226	18.83	0.07	0.022	(0.212)	0.012	0.010
227	18.92	0.07	0.022	(0.211)	0.012	0.010
228	19.00	0.07	0.022	(0.210)	0.012	0.010
229	19.08	0.10	0.032	(0.209)	0.018	0.015
230	19.17	0.10	0.032	(0.208)	0.018	0.015
231	19.25	0.10	0.032	(0.207)	0.018	0.015
232	19.33	0.13	0.043	(0.206)	0.023	0.020
233	19.42	0.13	0.043	(0.205)	0.023	0.020
234	19.50	0.13	0.043	(0.204)	0.023	0.020
235	19.58	0.10	0.032	(0.203)	0.018	0.015
236	19.67	0.10	0.032	(0.202)	0.018	0.015
237	19.75	0.10	0.032	(0.201)	0.018	0.015
238	19.83	0.07	0.022	(0.200)	0.012	0.010
239	19.92	0.07	0.022	(0.199)	0.012	0.010
240	20.00	0.07	0.022	(0.198)	0.012	0.010
241	20.08	0.10	0.032	(0.197)	0.018	0.015
242	20.17	0.10	0.032	(0.197)	0.018	0.015
243	20.25	0.10	0.032	(0.196)	0.018	0.015
244	20.33	0.10	0.032	(0.195)	0.018	0.015
245	20.42	0.10	0.032	(0.194)	0.018	0.015
246	20.50	0.10	0.032	(0.193)	0.018	0.015
247	20.58	0.10	0.032	(0.192)	0.018	0.015

248	20.67	0.10	0.032	(0.192)	0.018	0.015
249	20.75	0.10	0.032	(0.191)	0.018	0.015
250	20.83	0.07	0.022	(0.190)	0.012	0.010
251	20.92	0.07	0.022	(0.189)	0.012	0.010
252	21.00	0.07	0.022	(0.188)	0.012	0.010
253	21.08	0.10	0.032	(0.188)	0.018	0.015
254	21.17	0.10	0.032	(0.187)	0.018	0.015
255	21.25	0.10	0.032	(0.186)	0.018	0.015
256	21.33	0.07	0.022	(0.186)	0.012	0.010
257	21.42	0.07	0.022	(0.185)	0.012	0.010
258	21.50	0.07	0.022	(0.184)	0.012	0.010
259	21.58	0.10	0.032	(0.184)	0.018	0.015
260	21.67	0.10	0.032	(0.183)	0.018	0.015
261	21.75	0.10	0.032	(0.182)	0.018	0.015
262	21.83	0.07	0.022	(0.182)	0.012	0.010
263	21.92	0.07	0.022	(0.181)	0.012	0.010
264	22.00	0.07	0.022	(0.180)	0.012	0.010
265	22.08	0.10	0.032	(0.180)	0.018	0.015
266	22.17	0.10	0.032	(0.179)	0.018	0.015
267	22.25	0.10	0.032	(0.179)	0.018	0.015
268	22.33	0.07	0.022	(0.178)	0.012	0.010
269	22.42	0.07	0.022	(0.177)	0.012	0.010
270	22.50	0.07	0.022	(0.177)	0.012	0.010
271	22.58	0.07	0.022	(0.176)	0.012	0.010
272	22.67	0.07	0.022	(0.176)	0.012	0.010
273	22.75	0.07	0.022	(0.175)	0.012	0.010
274	22.83	0.07	0.022	(0.175)	0.012	0.010
275	22.92	0.07	0.022	(0.175)	0.012	0.010
276	23.00	0.07	0.022	(0.174)	0.012	0.010
277	23.08	0.07	0.022	(0.174)	0.012	0.010
278	23.17	0.07	0.022	(0.173)	0.012	0.010
279	23.25	0.07	0.022	(0.173)	0.012	0.010
280	23.33	0.07	0.022	(0.173)	0.012	0.010
281	23.42	0.07	0.022	(0.172)	0.012	0.010
282	23.50	0.07	0.022	(0.172)	0.012	0.010
283	23.58	0.07	0.022	(0.172)	0.012	0.010
284	23.67	0.07	0.022	(0.171)	0.012	0.010
285	23.75	0.07	0.022	(0.171)	0.012	0.010
286	23.83	0.07	0.022	(0.171)	0.012	0.010
287	23.92	0.07	0.022	(0.171)	0.012	0.010
288	24.00	0.07	0.022	(0.171)	0.012	0.010

(Loss Rate Not Used)

Sum = 100.0 Sum = 14.7

Flood volume = Effective rainfall 1.23(In)
times area 3.9(Ac.)/[(In)/(Ft.)] = 0.4(Ac.Ft)
Total soil loss = 1.46(In)
Total soil loss = 0.471(Ac.Ft)
Total rainfall = 2.69(In)
Flood volume = 17187.3 Cubic Feet
Total soil loss = 20504.2 Cubic Feet

Peak flow rate of this hydrograph = 0.649(CFS)

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0002	0.03	Q				
0+10	0.0005	0.04	Q				
0+15	0.0007	0.04	Q				
0+20	0.0011	0.05	Q				
0+25	0.0015	0.06	Q				
0+30	0.0019	0.06	Q				
0+35	0.0023	0.06	Q				
0+40	0.0027	0.06	Q				
0+45	0.0031	0.06	Q				
0+50	0.0035	0.07	Q				
0+55	0.0041	0.08	Q				
1+ 0	0.0046	0.08	Q				
1+ 5	0.0050	0.06	Q				
1+10	0.0054	0.06	Q				
1+15	0.0058	0.06	Q				
1+20	0.0062	0.06	Q				
1+25	0.0066	0.06	Q				
1+30	0.0070	0.06	Q				
1+35	0.0074	0.06	Q				
1+40	0.0078	0.06	Q				
1+45	0.0082	0.06	Q				
1+50	0.0087	0.07	Q				
1+55	0.0092	0.08	Q				
2+ 0	0.0097	0.08	Q				
2+ 5	0.0103	0.08	QV				
2+10	0.0108	0.08	QV				
2+15	0.0113	0.08	QV				
2+20	0.0118	0.08	QV				
2+25	0.0124	0.08	QV				
2+30	0.0129	0.08	QV				
2+35	0.0135	0.09	QV				
2+40	0.0142	0.10	QV				
2+45	0.0148	0.10	QV				
2+50	0.0155	0.10	QV				
2+55	0.0161	0.10	QV				
3+ 0	0.0168	0.10	QV				
3+ 5	0.0175	0.10	QV				
3+10	0.0181	0.10	QV				

3+15	0.0188	0.10	QV	|	|	|	|
3+20	0.0194	0.10	QV	|	|	|	|
3+25	0.0201	0.10	Q V	|	|	|	|
3+30	0.0207	0.10	Q V	|	|	|	|
3+35	0.0214	0.10	Q V	|	|	|	|
3+40	0.0221	0.10	Q V	|	|	|	|
3+45	0.0227	0.10	Q V	|	|	|	|
3+50	0.0235	0.11	Q V	|	|	|	|
3+55	0.0243	0.11	Q V	|	|	|	|
4+ 0	0.0251	0.11	Q V	|	|	|	|
4+ 5	0.0258	0.11	Q V	|	|	|	|
4+10	0.0266	0.11	Q V	|	|	|	|
4+15	0.0274	0.11	Q V	|	|	|	|
4+20	0.0283	0.13	Q V	|	|	|	|
4+25	0.0292	0.13	Q V	|	|	|	|
4+30	0.0301	0.13	Q V	|	|	|	|
4+35	0.0311	0.13	Q V	|	|	|	|
4+40	0.0320	0.13	Q V	|	|	|	|
4+45	0.0329	0.13	Q V	|	|	|	|
4+50	0.0339	0.15	Q V	|	|	|	|
4+55	0.0350	0.15	Q V	|	|	|	|
5+ 0	0.0360	0.15	Q V	|	|	|	|
5+ 5	0.0369	0.12	Q V	|	|	|	|
5+10	0.0377	0.11	Q V	|	|	|	|
5+15	0.0385	0.11	Q V	|	|	|	|
5+20	0.0394	0.13	Q V	|	|	|	|
5+25	0.0403	0.13	Q V	|	|	|	|
5+30	0.0412	0.13	Q V	|	|	|	|
5+35	0.0422	0.15	Q V	|	|	|	|
5+40	0.0433	0.15	Q V	|	|	|	|
5+45	0.0443	0.15	Q V	|	|	|	|
5+50	0.0454	0.15	Q V	|	|	|	|
5+55	0.0464	0.15	Q V	|	|	|	|
6+ 0	0.0475	0.15	Q V	|	|	|	|
6+ 5	0.0486	0.17	Q V	|	|	|	|
6+10	0.0498	0.17	Q V	|	|	|	|
6+15	0.0510	0.17	Q V	|	|	|	|
6+20	0.0522	0.17	Q V	|	|	|	|
6+25	0.0534	0.17	Q V	|	|	|	|
6+30	0.0545	0.17	Q V	|	|	|	|
6+35	0.0558	0.19	Q V	|	|	|	|
6+40	0.0571	0.19	Q V	|	|	|	|
6+45	0.0585	0.19	Q V	|	|	|	|
6+50	0.0598	0.19	Q V	|	|	|	|
6+55	0.0611	0.19	Q V	|	|	|	|
7+ 0	0.0624	0.19	Q V	|	|	|	|
7+ 5	0.0637	0.19	Q V	|	|	|	|
7+10	0.0650	0.19	Q V	|	|	|	|
7+15	0.0663	0.19	Q V	|	|	|	|
7+20	0.0678	0.21	Q V	|	|	|	|

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 7+25       0.0692      0.21  Q      V  |          |          |          |
 7+30       0.0707      0.21  Q      V  |          |          |          |
 7+35       0.0722      0.22  Q      V  |          |          |          |
 7+40       0.0738      0.23  Q      V  |          |          |          |
 7+45       0.0754      0.23  Q      V  |          |          |          |
 7+50       0.0770      0.24  Q      V  |          |          |          |
 7+55       0.0787      0.25  Q      V  |          |          |          |
 8+ 0       0.0804      0.25  Q       V |          |          |          |
 8+ 5       0.0824      0.28  |Q      V |          |          |          |
 8+10       0.0843      0.29  |Q      V |          |          |          |
 8+15       0.0863      0.29  |Q      V |          |          |          |
 8+20       0.0883      0.29  |Q      V |          |          |          |
 8+25       0.0902      0.29  |Q       V|          |          |          |
 8+30       0.0922      0.29  |Q       V|          |          |          |
 8+35       0.0943      0.30  |Q       V|          |          |          |
 8+40       0.0964      0.31  |Q       V|          |          |          |
 8+45       0.0985      0.31  |Q       V|          |          |          |
 8+50       0.1007      0.32  |Q        V          |          |          |
 8+55       0.1029      0.32  |Q        V          |          |          |
 9+ 0       0.1052      0.32  |Q        V          |          |          |
 9+ 5       0.1076      0.35  |Q        V          |          |          |
 9+10       0.1101      0.36  |Q        |V         |          |          |
 9+15       0.1126      0.36  |Q        |V         |          |          |
 9+20       0.1152      0.38  |Q        |V         |          |          |
 9+25       0.1178      0.38  |Q        |V         |          |          |
 9+30       0.1205      0.38  |Q        | V        |          |          |
 9+35       0.1232      0.40  |Q        | V        |          |          |
 9+40       0.1260      0.40  |Q        | V        |          |          |
 9+45       0.1287      0.40  |Q        |  V       |          |          |
 9+50       0.1316      0.42  |Q        |  V       |          |          |
 9+55       0.1345      0.42  |Q        |  V       |          |          |
10+ 0       0.1374      0.42  |Q        |  V       |          |          |
10+ 5       0.1396      0.32  |Q        |   V      |          |          |
10+10       0.1415      0.29  |Q        |   V      |          |          |
10+15       0.1435      0.29  |Q        |   V      |          |          |
10+20       0.1455      0.29  |Q        |   V      |          |          |
10+25       0.1475      0.29  |Q        |   V      |          |          |
10+30       0.1494      0.29  |Q        |    V     |          |          |
10+35       0.1519      0.36  |Q        |    V     |          |          |
10+40       0.1545      0.38  |Q        |    V     |          |          |
10+45       0.1572      0.38  |Q        |    V     |          |          |
10+50       0.1598      0.38  |Q        |     V    |          |          |
10+55       0.1624      0.38  |Q        |     V    |          |          |
11+ 0       0.1650      0.38  |Q        |     V    |          |          |
11+ 5       0.1676      0.37  |Q        |     V    |          |          |
11+10       0.1701      0.36  |Q        |      V   |          |          |
11+15       0.1726      0.36  |Q        |      V   |          |          |
11+20       0.1751      0.36  |Q        |      V   |          |          |
11+25       0.1776      0.36  |Q        |       V  |          |          |
11+30       0.1801      0.36  |Q        |       V  |          |          |
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11+35       0.1824      0.33  |Q        |       V |         |         |
11+40       0.1846      0.32  |Q        |       V |         |         |
11+45       0.1868      0.32  |Q        |       V |         |         |
11+50       0.1892      0.34  |Q        |        V|         |         |
11+55       0.1915      0.34  |Q        |        V|         |         |
12+ 0       0.1939      0.34  |Q        |        V|         |         |
12+ 5       0.1970      0.44  |Q        |        V|         |         |
12+10       0.2003      0.48  |Q        |         V         |         |
12+15       0.2035      0.48  |Q        |         V         |         |
12+20       0.2069      0.49  |Q        |         V         |         |
12+25       0.2104      0.50  |Q        |          |V       |         |
12+30       0.2138      0.50  |Q        |          |V       |         |
12+35       0.2174      0.52  | Q       |          | V      |         |
12+40       0.2211      0.53  | Q       |          | V      |         |
12+45       0.2248      0.53  | Q       |          | V      |         |
12+50       0.2285      0.55  | Q       |          |  V     |         |
12+55       0.2323      0.55  | Q       |          |  V     |         |
13+ 0       0.2362      0.55  | Q       |          |  V     |         |
13+ 5       0.2405      0.62  | Q       |          |   V    |         |
13+10       0.2449      0.65  | Q       |          |   V    |         |
13+15       0.2494      0.65  | Q       |          |    V   |         |
13+20       0.2539      0.65  | Q       |          |    V   |         |
13+25       0.2584      0.65  | Q       |          |     V  |         |
13+30       0.2628      0.65  | Q       |          |     V  |         |
13+35       0.2662      0.49  |Q        |          |     V  |         |
13+40       0.2692      0.44  |Q        |          |      V |         |
13+45       0.2723      0.44  |Q        |          |      V |         |
13+50       0.2753      0.44  |Q        |          |      V |         |
13+55       0.2783      0.44  |Q        |          |       V|         |
14+ 0       0.2813      0.44  |Q        |          |       V|         |
14+ 5       0.2848      0.50  |Q        |          |       V|         |
14+10       0.2883      0.52  | Q       |          |        V|        |
14+15       0.2919      0.52  | Q       |          |        V|        |
14+20       0.2953      0.50  | Q       |          |        V|        |
14+25       0.2987      0.50  |Q        |          |         V        |
14+30       0.3022      0.50  |Q        |          |         V        |
14+35       0.3056      0.50  |Q        |          |         V        |
14+40       0.3090      0.50  |Q        |          |          |V      |
14+45       0.3124      0.50  |Q        |          |          |V      |
14+50       0.3157      0.48  |Q        |          |          | V     |
14+55       0.3190      0.48  |Q        |          |          | V     |
15+ 0       0.3223      0.48  |Q        |          |          | V     |
15+ 5       0.3255      0.46  |Q        |          |          | V     |
15+10       0.3287      0.46  |Q        |          |          |  V    |
15+15       0.3318      0.46  |Q        |          |          |  V    |
15+20       0.3349      0.44  |Q        |          |          |  V    |
15+25       0.3379      0.44  |Q        |          |          |   V   |
15+30       0.3409      0.44  |Q        |          |          |   V   |
15+35       0.3436      0.38  |Q        |          |          |   V   |
15+40       0.3461      0.36  |Q        |          |          |    V  |
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15+45       0.3486      0.36  |Q        |          |          |    V     |
15+50       0.3511      0.36  |Q        |          |          |    V     |
15+55       0.3536      0.36  |Q        |          |          |    V     |
16+ 0       0.3560      0.36  |Q        |          |          |     V    |
16+ 5       0.3571      0.15  Q         |          |          |     V    |
16+10       0.3576      0.08  Q         |          |          |     V    |
16+15       0.3581      0.08  Q         |          |          |     V    |
16+20       0.3587      0.08  Q         |          |          |     V    |
16+25       0.3592      0.08  Q         |          |          |     V    |
16+30       0.3597      0.08  Q         |          |          |     V    |
16+35       0.3601      0.06  Q         |          |          |     V    |
16+40       0.3605      0.06  Q         |          |          |     V    |
16+45       0.3609      0.06  Q         |          |          |     V    |
16+50       0.3613      0.06  Q         |          |          |     V    |
16+55       0.3617      0.06  Q         |          |          |     V    |
17+ 0       0.3621      0.06  Q         |          |          |     V    |
17+ 5       0.3627      0.09  Q         |          |          |     V    |
17+10       0.3634      0.10  Q         |          |          |     V    |
17+15       0.3640      0.10  Q         |          |          |     V    |
17+20       0.3647      0.10  Q         |          |          |     V    |
17+25       0.3653      0.10  Q         |          |          |      V   |
17+30       0.3660      0.10  Q         |          |          |      V   |
17+35       0.3666      0.10  Q         |          |          |      V   |
17+40       0.3673      0.10  Q         |          |          |      V   |
17+45       0.3680      0.10  Q         |          |          |      V   |
17+50       0.3685      0.08  Q         |          |          |      V   |
17+55       0.3690      0.08  Q         |          |          |      V   |
18+ 0       0.3696      0.08  Q         |          |          |      V   |
18+ 5       0.3701      0.08  Q         |          |          |      V   |
18+10       0.3706      0.08  Q         |          |          |      V   |
18+15       0.3712      0.08  Q         |          |          |      V   |
18+20       0.3717      0.08  Q         |          |          |      V   |
18+25       0.3722      0.08  Q         |          |          |      V   |
18+30       0.3727      0.08  Q         |          |          |      V   |
18+35       0.3732      0.06  Q         |          |          |      V   |
18+40       0.3736      0.06  Q         |          |          |      V   |
18+45       0.3739      0.06  Q         |          |          |      V   |
18+50       0.3742      0.04  Q         |          |          |      V   |
18+55       0.3745      0.04  Q         |          |          |      V   |
19+ 0       0.3748      0.04  Q         |          |          |      V   |
19+ 5       0.3751      0.05  Q         |          |          |       V  |
19+10       0.3755      0.06  Q         |          |          |       V  |
19+15       0.3759      0.06  Q         |          |          |       V  |
19+20       0.3764      0.07  Q         |          |          |       V  |
19+25       0.3769      0.08  Q         |          |          |       V  |
19+30       0.3775      0.08  Q         |          |          |       V  |
19+35       0.3779      0.06  Q         |          |          |       V  |
19+40       0.3783      0.06  Q         |          |          |       V  |
19+45       0.3787      0.06  Q         |          |          |       V  |
19+50       0.3790      0.04  Q         |          |          |       V  |
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19+55	0.3792	0.04	Q	|	|	|	V |
20+ 0	0.3795	0.04	Q	|	|	|	V |
20+ 5	0.3799	0.05	Q	|	|	|	V |
20+10	0.3803	0.06	Q	|	|	|	V |
20+15	0.3807	0.06	Q	|	|	|	V |
20+20	0.3811	0.06	Q	|	|	|	V |
20+25	0.3814	0.06	Q	|	|	|	V |
20+30	0.3818	0.06	Q	|	|	|	V |
20+35	0.3822	0.06	Q	|	|	|	V |
20+40	0.3826	0.06	Q	|	|	|	V |
20+45	0.3830	0.06	Q	|	|	|	V |
20+50	0.3833	0.04	Q	|	|	|	V |
20+55	0.3836	0.04	Q	|	|	|	V |
21+ 0	0.3838	0.04	Q	|	|	|	V |
21+ 5	0.3842	0.05	Q	|	|	|	V |
21+10	0.3846	0.06	Q	|	|	|	V |
21+15	0.3850	0.06	Q	|	|	|	V|
21+20	0.3853	0.04	Q	|	|	|	V|
21+25	0.3856	0.04	Q	|	|	|	V|
21+30	0.3858	0.04	Q	|	|	|	V|
21+35	0.3862	0.05	Q	|	|	|	V|
21+40	0.3866	0.06	Q	|	|	|	V|
21+45	0.3870	0.06	Q	|	|	|	V|
21+50	0.3873	0.04	Q	|	|	|	V|
21+55	0.3875	0.04	Q	|	|	|	V|
22+ 0	0.3878	0.04	Q	|	|	|	V|
22+ 5	0.3882	0.05	Q	|	|	|	V|
22+10	0.3885	0.06	Q	|	|	|	V|
22+15	0.3889	0.06	Q	|	|	|	V|
22+20	0.3892	0.04	Q	|	|	|	V|
22+25	0.3895	0.04	Q	|	|	|	V|
22+30	0.3898	0.04	Q	|	|	|	V|
22+35	0.3900	0.04	Q	|	|	|	V|
22+40	0.3903	0.04	Q	|	|	|	V|
22+45	0.3906	0.04	Q	|	|	|	V|
22+50	0.3908	0.04	Q	|	|	|	V|
22+55	0.3911	0.04	Q	|	|	|	V|
23+ 0	0.3913	0.04	Q	|	|	|	V|
23+ 5	0.3916	0.04	Q	|	|	|	V|
23+10	0.3919	0.04	Q	|	|	|	V|
23+15	0.3921	0.04	Q	|	|	|	V|
23+20	0.3924	0.04	Q	|	|	|	V|
23+25	0.3927	0.04	Q	|	|	|	V|
23+30	0.3929	0.04	Q	|	|	|	V|
23+35	0.3932	0.04	Q	|	|	|	V|
23+40	0.3934	0.04	Q	|	|	|	V|
23+45	0.3937	0.04	Q	|	|	|	V|
23+50	0.3940	0.04	Q	|	|	|	V|
23+55	0.3942	0.04	Q	|	|	|	V|
24+ 0	0.3945	0.04	Q	|	|	|	V|

```
   24+ 5       0.3946      0.01  Q         |         |         |         V
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Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ A. **On-site storm drain inlets**	❑ **Locations of inlets.**	❑ **Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.**	❑ **Maintain and periodically repaint or replace inlet markings.** ❑ **Provide stormwater pollution prevention information to new site owners, lessees, or operators.** ❑ **See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** ❑ **Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."**
❑ B. **Interior floor drains and elevator shaft sump pumps**		❑ **State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.**	❑ **Inspect and maintain drains to prevent blockages and overflow.**
❑ C. **Interior parking garages**		❑ **State that parking garage floor drains will be plumbed to the sanitary sewer.**	❑ **Inspect and maintain drains to prevent blockages and overflow.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ D1. **Need for future indoor & structural pest control**		❑ **Note building design features that discourage entry of pests.**	❑ **Provide Integrated Pest Management information to owners, lessees, and operators.**
❑ D2. **Landscape/ Outdoor Pesticide Use**	❑ **Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained.** ❑ **Show self-retaining landscape areas, if any.** ❑ **Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)**	**State that final landscape plans will accomplish all of the following.** ❑ **Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.** ❑ **Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.** ❑ **Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.** ❑ **Consider using pest-resistant plants, especially adjacent to hardscape.** **To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.**	❑ **Maintain landscaping using minimum or no pesticides.** ❑ **See applicable operational BMPs in "What you should know for…..Landscape and Gardening"** at http://rcflood.org/stormwater/**Error! Hyperlink reference not valid.** ❑ **Provide IPM information to new owners, lessees and operators.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ E. **Pools, spas, ponds, decorative fountains, and other water features.**	☐ **Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)**	**If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.**	☐ **See applicable operational BMPs in** "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
☐ F. **Food service**	☐ **For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment.** ☐ **On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.**	☐ **Describe the location and features of the designated cleaning area.** ☐ **Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.**	☐ **See the brochure, "**The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ **Provide this brochure to new site owners, lessees, and operators.**
■ G. **Refuse areas**	☐ **Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas.** ☐ **If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area.** ☐ **Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.**	☐ **State how site refuse will be handled and provide supporting detail to what is shown on plans.** ☐ **State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.**	☐ **State how the following will be implemented:** **Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ H. **Industrial processes.**	❑ **Show process area.**	❑ **If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."**	❑ **See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
■ I. **Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)**	❑ **Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area.** ❑ **Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults.** ❑ **Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.**	**Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.** **Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for:** ▪ **Hazardous Waste Generation** ▪ **Hazardous Materials Release Response and Inventory** ▪ **California Accidental Release (CalARP)** ▪ **Aboveground Storage Tank** ▪ **Uniform Fire Code Article 80 Section 103(b) & (c) 1991** ▪ **Underground Storage Tank** **www.cchealth.org/groups/hazmat/**	❑ **See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ J. **Vehicle and Equipment Cleaning**	❑ **Show on drawings as appropriate:** **(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.** **(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).** **(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.** **(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.**	❑ **If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.**	**Describe operational measures to implement the following (if applicable):** ❑ **Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.** Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ❑ **Car dealerships and similar may rinse cars with water only.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ K. **Vehicle/Equipment Repair and Maintenance**	❑ **Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater.** ❑ **Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.** ❑ **Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.**	❑ **State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.** ❑ **State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.** ❑ **State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.**	**In the Stormwater Control Plan, note that all of the following restrictions apply to use the site:** ❑ **No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains.** ❑ **No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.** ❑ **No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.** Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ L. **Fuel Dispensing Areas**	❑ **Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable.** ❑ **Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.**		❑ **The property owner shall dry sweep the fueling area routinely.** ❑ **See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

[6] **The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ M. **Loading Docks**	❑ **Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer.** ❑ **Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation.** ❑ **Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.**		❑ **Move loaded and unloaded items indoors as soon as possible.** ❑ **See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ N. **Fire Sprinkler Test Water**		❑ **Provide a means to drain fire sprinkler test water to the sanitary sewer.**	❑ **See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**
O. **Miscellaneous Drain or Wash Water or Other Sources** ❑ **Boiler drain lines** ❑ **Condensate drain lines** ❑ **Rooftop equipment** ❑ **Drainage sumps** ❑ **Roofing, gutters, and trim.** ❑ **Other sources**		❑ **Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.** ❑ **Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.** ❑ **Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment.** ❑ **Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.** ❑ **Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.** **Include controls for other sources as specified by local reviewer.**	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
■ P. **Plazas, sidewalks, and parking lots.**			■ **Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.**

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

Operation and Maintenance Plan

Project Title: 202 E. Third Street

Original Date Prepared: May 10, 2022
Revision Date(s): _____
Revision Date(s): _____
Revision Date(s): _____
Revision Date(s): _____

Contact Information:

Prepared for: Premium Land Development, LLC
35109 Avenue C
Yucaipa, CA 92399
(909)-283-8588

Prepared by: Blue Engineering and Consulting, Inc
Rancho Cucamonga, CA 91739
(909)-248-6557

Contact: Angel Cesar, P.E.

Client Signature:

_____

_____

Table of Contents

I. Inspection and Maintenance Log 3
II. Updates, Revisions, and Errata 4
III. Introduction 5
IV. Responsibility for Maintenance 6
IV.A General 6
IV.B Staff Training Program 6
IV.C Records 6
IV.D Safety 6
V. Summary of Drainage Management Areas and Stormwater BMPs 7
V.A Drainage Areas 7
V.B Structural Post-Construction BMPs 7
V.C Self-Retaining Areas or Other 7
VI. Stormwater BMP Design Documentation 9
VI.A “As-Built” Drawings of each Stormwater BMP 9
VI.B Manufacturer’s Data, Manuals, and Maintenance Requirements 9
VI.C Specific Operation and Maintenance Concerns and Troubleshooting 9
VII. Maintenance Schedule or Matrix 10
VII.A Maintenance Schedule 10
VII.B Service Agreement Information 10

List of Appendices

Appendix 1: Inspection and Maintenance Logs
Appendix 2: Updates, Revisions, and Errata
Appendix 3: Maintenance Mechanism
Appendix 4: Training Records
Appendix 5: Site Plan and Details
Appendix 6: “As-Built” Drawings
Appendix 7: Manufacturer Information
Appendix 8: Service Agreement Information

I. Inspection and Maintenance Log

Date	Observations/Actions	Inspector

II. Updates, Revisions and Errata

See Appendix 2

III. Introduction

The project is located in the City of Beaumont at 202 E. Third Street. The project proposes an approximate 0.75-acre development of asphalt to an already existing site. The project is bounded by a railroad line to the north, Industrial buildings to the east, E. Third Street to the south, and California Avenue to the west.

IV. Responsibility for Maintenance

General

Funding will be provided by the owner

Records

Maintenance records are to be inserted chronologically in Appendix 1 of this O&M Plan

Safety

All maintenance procedures shall comply with the latest OSHA standards.

Replacement Cost

A bio-retention basin is a non-manufactured BMPs. When the site fails to store the additional volume within the allowable time. The cost to replace the bio-retention basin would be the cost to remove approximately the top 5 feet of soil and gravel and replace with new soil and gravel with minimal compaction to allow for storage. That cost can vary depending on time, approximation of soil and gravel. Replacement cost can be $10,000-$30,000.

V. Summary of Drainage Management Areas and Stormwater BMPs.

Drainage Areas

See Appendix 5 of this O&M Plan for WQMP Site map.

DMA A	Pervious	90,630 sf (2.08 ac)		
	Impervious	77,570 sf (1.78 ac)		

Geo-location of the BMPs using latitude and longitude coordinates

BMP No. or ID	BMP Identifier and Description	Corresponding plan Sheet(s)	Latitude	Longitude
BR #1	Bio-Retention Basin	WQMP Site Map	333.924918	-116.979947

Structural Post-Construction BMPs

See Appendix 5 of this O&M Plan for WQMP Site map.

VI. Stormwater BMP Design Documentation

“As-Built” Drawings of each Stormwater BMP

See Appendix 6 of this O&M Plan for “as-built” drawings.

Manufacturer’s Data, Manuals, and Maintenance Requirements

Not applicable, there are no manufactured stormwater BMPs.

Specific Operation and Maintenance Concerns and Troubleshooting

Not applicable.

VII. Maintenance Schedule or Matrix

Maintenance Schedule

Schedule	Inspection and Maintenance Activity
Semi-monthly including just before the annual storm season and following rainfall events.	• Routine maintenance and inspection. • Remove debris and litter from the entire basin to minimize filter clogging and to improve aesthetics. • Check for obvious problems and repair as needed. Address odor, insects, and overgrowth issues associated with stagnant or standing water in the basin bottom. There should be no long-term ponding water. • Check for erosion and sediment laden areas in the basins. Repair as needed. Clean forebay of debris, litter, sediment, etc upon discovery. • Revegetate side slopes where needed.
Annually. Schedule these inspections within 72 hours after a significant rainfall and prior to the rainy season (October 1st). "Significant rainfall" is defined as 0.5 inches or greater of rainfall: http://www.wrh.noaa.gov/forecast/wxtables/	• Inspection of hydraulic and structural facilities. Examine the inlet for blockage, the embankment and spillway integrity, as well as damage to any structural element. • Check side slopes and embankments for erosion, slumping and overgrowth. • Inspect the sand media at the filter drain to verify it is allowing acceptable infiltration. Scarify the top 3 inches by raking the filter drain's sand surface annually. • Check the filter drain underdrains for damage or clogging. Repair as needed. • Repair basin inlets, outlets, forebays, and energy dissipaters whenever damage is discovered. • No water should be present 72 hours after an event. No long tern standing water should be present at all. No algae formation should be visible. Correct problem as needed.
Every 5 years or sooner depending on the observed drain times (no more than 72 hours to empty the basin)	• Remove the top 3 inches of sand from the filter drain and backfill with 3 inches of new sand to return the sand layer to its original depth. When scarification or removal of the top 3 inches of sand is no longer effective, remove and replace sand filter layer.

VII.B Service Agreement Information

See Appendix 8 of this O&M Plan for service agreement information with any contractors regarding the O&M of BMPs at the site, if any.

Appendix 1: Inspection and Maintenance Logs

Insert Additional Inspection or Maintenance Logs Here

Date	Observations/Actions	Inspector

Appendix 2: Updates, Revisions, and Errata

Insert Additional Updates, Revisions, and Errata Logs Here

Revision Number	Date	Brief Description of Update/Revision/Errata, include section and page number	Prepared and Approved by

Appendix 3: Maintenance and Recording Mechanism

Copy of Covenant Agreement Establishing Notification Process And Responsibility For Water Quality Management Plan Implementation And Maintenance

Notification Process and Responsibility

1. Name: _____
   Title: _____
   Phone No.: _____

   WQMP Responsibilities:
   (1) Routine inspections to evaluate BMP effectiveness.
   (2) Identifying when BMPs require maintenance.
   (3) Working with qualified contractors to maintain the BMP.
   (4) Recordkeeping of inspections and maintenance activities.

2. Name: _____
   Title: _____
   Phone No.: _____

   WQMP Responsibilities:
   (1) Cleaning, repairing, servicing, and maintenance of BMP.

3. Name: _____
   Title: _____
   Phone No.: _____

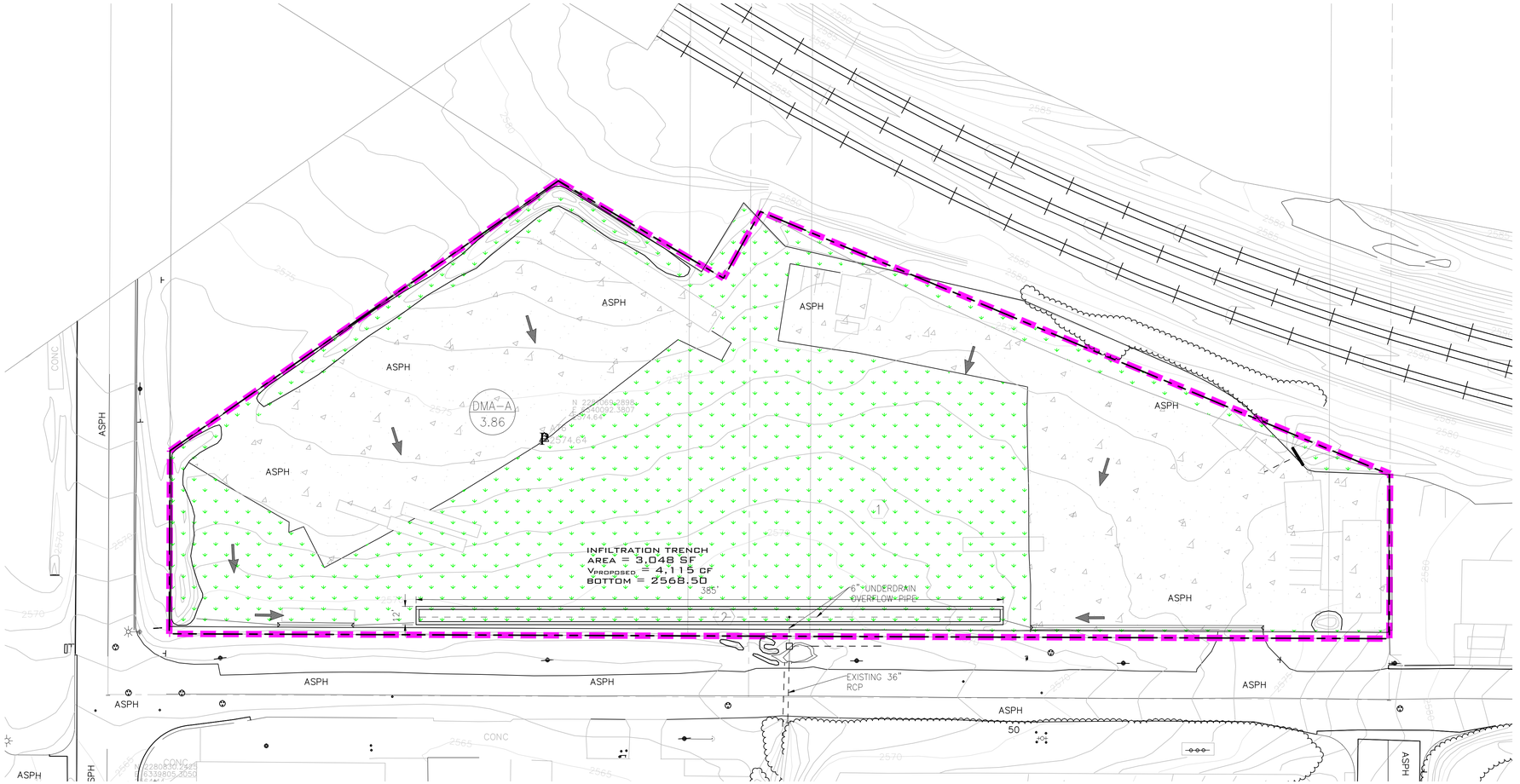
   WQMP Responsibilities:
   (1) In event of failure, and with City Engineer's authorization, modify or replace with an upgraded BMP to prevent future failure.
   (2) Notify successors of BMPs and maintenance requirements.

Appendix 4: Training Records

Insert Training Records with Brief Discussion Here

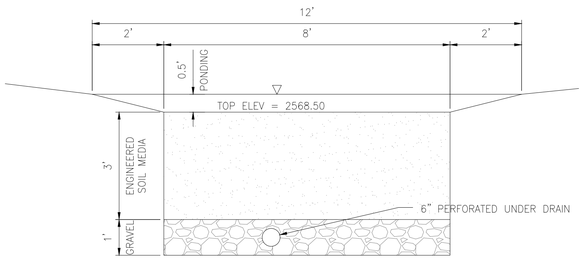
Appendix 5: Site Plan and Details

WQMP Site Map and BMP Details



LEGEND

- WATERSHED BOUNDARY
- CENTERLINE
- DRAINAGE ARROW
- LANDSCAPE AREA
- IMPERVIOUS AREA



BIO-RETENTION DETAIL
SCALE: 1" = 2'

PROJECT BMP CONFORMANCE ANALYSIS

NAME	AREA (SF)	IMPERVIOUS AREA (SF)	PERVIOUS AREA (SF)	I_F	C	V_{BMP}	BMP	$A_{PROVIDED}$	$V_{PROVIDED}$
DMA A	168,200	77,570	90,630	0.461	0.32	3,754 CF	BIO-RETENTION BASIN	3,048 SF	5,878 CF

PROJECT AREA BREAKDOWN

PROJECT TOTAL AREA	164,475 SF
PROJECT PAVEMENT AREA	79,832 SF
PROJECT LANDSCAPE AREA	84,643 SF

BMP MAINTENANCE

BMP	NAME	MAINTENANCE TYPE	FREQUENCY
1	LANDSCAPING, PARK AND TRASH	TRASH CLEANUP	ONCE A WEEK
2	BIO-RETENTION BASIN	TRASH CLEANUP	ONCE A WEEK

PW#2022-0085

DIGALERT — Call 2 Working Days Before You Dig! 811

BENCHMARK:

IN BEAUMONT, AT THE JUNCTION OF CALIFORNIA AVENUE AND FIFTH PLACE, 28.9 M (94.8FT) WEST OF THE AVENUE CENTERLINE, 7.7 M (25.3 FT) SOUTH OF THE CENTERLINE OF FIFTH PLACE, 1.1 M (3.6 FT) NORTH OF A GUY WIRE, 0.79 M (2.6 FT) SOUTH OF A POWER POLE, 0.18 M (0.6 FT) EAST OF A WITNESS POST.
THE MARK IS 0.6 METERS W FROM A SECOND WITNESS POST. THE MARK IS ABOVE LEVEL WITH THE AVENUE.

ELEV. 2576.61, NGVD 29

ENGINEER

BY	MARK	DESCRIPTION	APPR.	DATE
	1			

REVISIONS — CITY

SEAL

BLUE Engineering & Consulting, Inc
9320 BASELINE RD., STE. D – RANCHO CUCAMONGA, CA 91701
INFO@BLUECIVILENG.COM – WWW.BLUECIVILENG.COM
909-248-6557

ANGEL CESAR, P.E.
R.C.E. 87222 EXP. 09/30/23
DATE

REGISTERED PROFESSIONAL ENGINEER — ANGEL CESAR — No. 87222 — CIVIL — STATE OF CALIFORNIA

DESIGN BY:
DRAWN BY:
CHECKED BY:
SCALE:
DATE:
JOB NUMBER:

BEAUMONT — CALIFORNIA
PUBLIC WORKS DEPARTMENT
550 E. 6TH ST, BEAUMONT, CA 92223

Reviewed By: _____ STAFF ENGINEER Date: _____

Recommended for Approval By: _____ PRINCIPAL ENGINEER Date: _____

Approved By: _____ CITY ENGINEER Date: _____

CITY OF BEAUMONT, PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
550E. 6th St
Beaumont, CA 92223
TEL: (951) 769-8520 FAX: (951) 769-8526

CITY OF BEAUMONT, CALIFORNIA
GRADING PLANS FOR:
202 E. THIRD STREET
APN. 418-200-003, -004, -005

WQMP EXHIBIT

SHEET 4 OF 4 SHEETS
FILE NO:

3.5 Bioretention Facility

Type of BMP	LID – Bioretention
Treatment Mechanisms	Infiltration, Evapotranspiration, Evaporation, Biofiltration
Maximum Drainage Area	This BMP is intended to be integrated into a project's landscaped area in a distributed manner. Typically, contributing drainage areas to Bioretention Facilities range from less than 1 acre to a maximum of around 10 acres.
Other Names	Rain Garden, Bioretention Cell, Bioretention Basin, Biofiltration Basin, Landscaped Filter Basin, Porous Landscape Detention

Description

Bioretention Facilities are shallow, vegetated basins underlain by an engineered soil media. Healthy plant and biological activity in the root zone maintain and renew the macro-pore space in the soil and maximize plant uptake of pollutants and runoff. This keeps the Best Management Practice (BMP) from becoming clogged and allows more of the soil column to function as both a sponge (retaining water) and a highly effective and self-maintaining biofilter. In most cases, the bottom of a Bioretention Facility is unlined, which also provides an opportunity for infiltration to the extent the underlying onsite soil can accommodate. When the infiltration rate of the underlying soil is exceeded, fully biotreated flows are discharged via underdrains. Bioretention Facilities therefore will inherently achieve the maximum feasible level of infiltration and evapotranspiration and achieve the minimum feasible (but highly biotreated) discharge to the storm drain system.

Siting Considerations

These facilities work best when they are designed in a relatively level area. Unlike other BMPs, Bioretention Facilities can be used in smaller landscaped spaces on the site, such as:

- ✓ Parking islands
- ✓ Medians
- ✓ Site entrances

Landscaped areas on the site (such as may otherwise be required through minimum landscaping ordinances), can often be designed as Bioretention Facilities. This can be accomplished by:

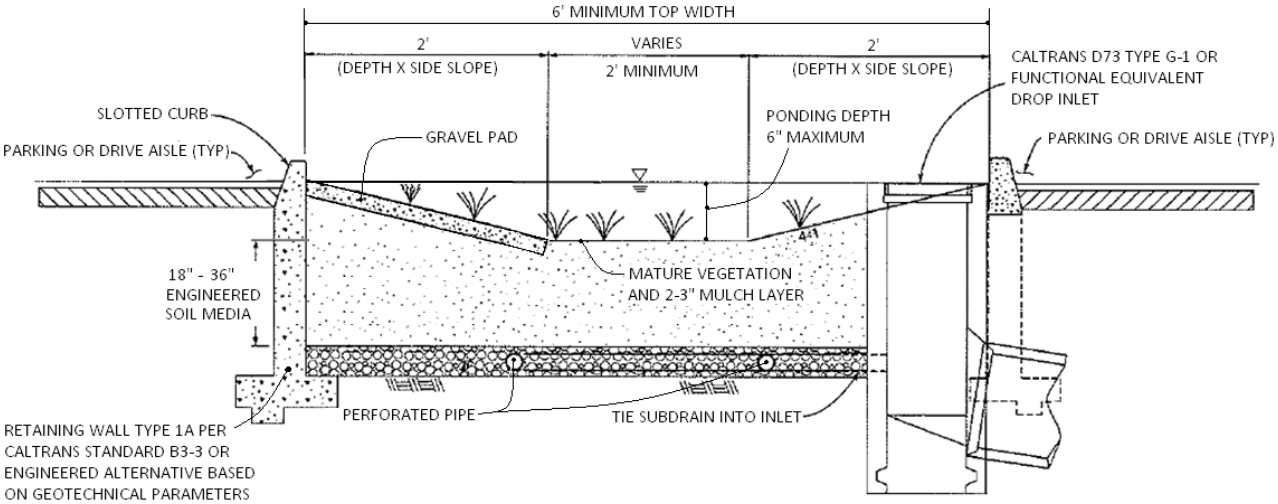
- *Depressing* landscaped areas below adjacent impervious surfaces, rather than elevating those areas
- Grading the site to direct runoff from those impervious surfaces *into* the Bioretention Facility, rather than away from the landscaping
- Sizing and designing the depressed landscaped area as a Bioretention Facility as described in this Fact Sheet

Bioretention Facilities should however not be used downstream of areas where large amounts of sediment can clog the system. Placing a Bioretention Facility at the toe of a steep slope should also be avoided due to the potential for clogging the engineered soil media with erosion from the slope, as well as the potential for damaging the vegetation.

Design and Sizing Criteria

The recommended cross section necessary for a Bioretention Facility includes:

- Vegetated area
- 18' minimum depth of engineered soil media
- 12' minimum gravel layer depth with 6' perforated pipes (added flow control features such as orifice plates may be required to mitigate for HCOC conditions)



While the 18-inch minimum engineered soil media depth can be used in some cases, it is recommended to use 24 inches or a preferred 36 inches to provide an adequate root zone for the chosen plant palate. Such a design also provides for improved removal effectiveness for nutrients. The recommended ponding depth inside of a Bioretention Facility is 6 inches; measured from the flat bottom surface to the top of the water surface as shown in Figure 1.

Because this BMP is filled with an engineered soil media, pore space in the soil and gravel layer is assumed to provide storage volume. However, several considerations must be noted:

- Surcharge storage above the soil surface (6 inches) is important to assure that design flows do not bypass the BMP when runoff exceeds the soil's absorption rate.
- In cases where the Bioretention Facility contains engineered soil media deeper than 36 inches, the pore space within the engineered soil media can only be counted to the 36-inch depth.
- A maximum of 30 percent pore space can be used for the soil media whereas a maximum of 40 percent pore space can be use for the gravel layer.

Figure 1: Standard Layout for a Bioretention Facility

Engineered Soil Media Requirements

The engineered soil media shall be comprised of 85 percent mineral component and 15 percent organic component, by volume, drum mixed prior to placement. The mineral component shall be a Class A sandy loam topsoil that meets the range specified in Table 1 below. The organic component shall be nitrogen stabilized compost[1], such that nitrogen does not leach from the media.

Table 1: Mineral Component Range Requirements

Percent Range	Component
70-80	Sand
15-20	Silt
5-10	Clay

The trip ticket, or certificate of compliance, shall be made available to the inspector to prove the engineered mix meets this specification.

Vegetation Requirements

Vegetative cover is important to minimize erosion and ensure that treatment occurs in the Bioretention Facility. The area should be designed for at least 70 percent mature coverage throughout the Bioretention Facility. To prevent the BMP from being used as walkways, Bioretention Facilities shall be planted with a combination of small trees, densely planted shrubs, and natural grasses. Grasses shall be native or ornamental; preferably ones that do not need to be mowed. The application of fertilizers and pesticides should be minimal. To maintain oxygen levels for the vegetation and promote biodegradation, it is important that vegetation not be completely submerged for any extended period of time. Therefore, a maximum of 6 inches of ponded water shall be used in the design to ensure that plants within the Bioretention Facility remain healthy.

A 2 to 3-inch layer of standard shredded aged hardwood mulch shall be placed as the top layer inside the Bioretention Facility. The 6-inch ponding depth shown in Figure 1 above shall be measured from the top surface of the 2 to 3-inch mulch layer.

Curb Cuts

To allow water to flow into the Bioretention Facility, 1-foot-wide (minimum) curb cuts should be placed approximately every 10 feet around the perimeter of the Bioretention Facility. Figure 2 shows a curb cut in a Bioretention Facility. Curb cut flow lines must be at or above the V_{BMP} water surface level.

[1] For more information on compost, visit the US Composting Council website at: http://compostingcouncil.org/

Figure 2: Curb Cut located in a Bioretention Facility

To reduce erosion, a gravel pad shall be placed at each inlet point to the Bioretention Facility. The gravel should be 1- to 1.5-inch diameter in size. The gravel should overlap the curb cut opening a minimum of 6 inches. The gravel pad inside the Bioretention Facility should be flush with the finished surface at the curb cut and extend to the bottom of the slope.

In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet. See Figure 3.

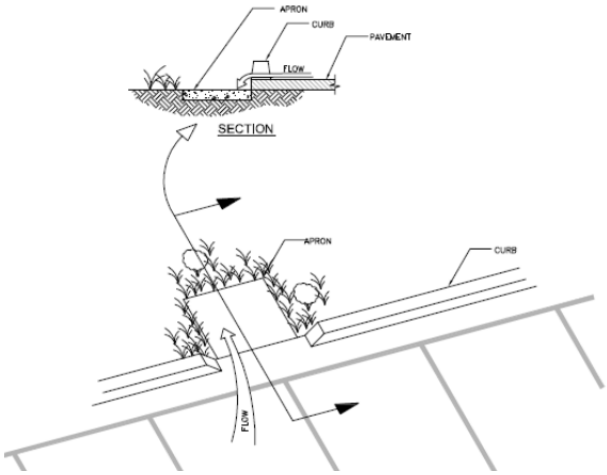


Figure 3: Apron located in a Bioretention Facility

Terracing the Landscaped Filter Basin

It is recommended that Bioretention Facilities be level. In the event the facility site slopes and lacks proper design, water would fill the lowest point of the BMP and then discharge from the basin without being treated. To ensure that the water will be held within the Bioretention Facility on sloped sites, the BMP must be terraced with nonporous check dams to provide the required storage and treatment capacity.

The terraced version of this BMP shall be used on non-flat sites with no more than a 3 percent slope. The surcharge depth cannot exceed 0.5 feet, and side slopes shall not exceed 4:1. Table 2 below shows the spacing of the check dams, and slopes shall be rounded up (i.e., 2.5 percent slope shall use 10' spacing for check dams).

Table 2: Check Dam Spacing

6" Check Dam Spacing	
Slope	**Spacing**
1%	*25'*
2%	*15'*
3%	*10'*

Roof Runoff

Roof downspouts may be directed towards Bioretention Facilities. However, the downspouts must discharge onto a concrete splash block to protect the Bioretention Facility from erosion.

Retaining Walls

It is recommended that Retaining Wall Type 1A, per Caltrans Standard B3-3 or equivalent, be constructed around the entire perimeter of the Bioretention Facility. This practice will protect the sides of the Bioretention Facility from collapsing during construction and maintenance or from high service loads adjacent to the BMP. Where such service loads would not exist adjacent to the BMP, an engineered alternative may be used if signed by a licensed civil engineer.

Side Slope Requirements

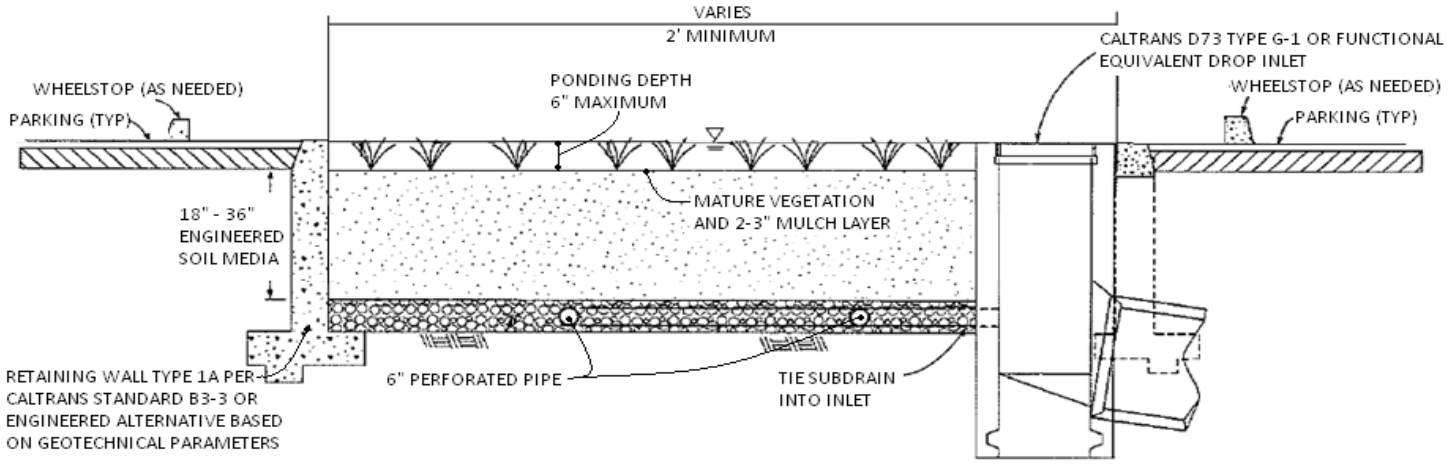
Bioretention Facilities Requiring Side Slopes

The design should assure that the Bioretention Facility does not present a tripping hazard. Bioretention Facilities proposed near pedestrian areas, such as areas parallel to parking spaces or along a walkway, must have a gentle slope to the bottom of the facility. Side slopes inside of a Bioretention Facility shall be 4:1. A typical cross section for the Bioretention Facility is shown in Figure 1.

Bioretention Facilities Not Requiring Side Slopes

Where cars park perpendicular to the Bioretention Facility, side slopes are not required. A 6-inch maximum drop may be used, and the Bioretention Facility must be planted with trees and shrubs to prevent pedestrian access. In this case, a curb is not placed around the Bioretention Facility,

but wheel stops shall be used to prevent vehicles from entering the Bioretention Facility, as shown in Figure 4.



Planter Boxes

Bioretention Facilities can also be placed above ground as planter boxes. Planter boxes must have a minimum width of 2 feet, a maximum surcharge depth of 6 inches, and no side slopes are necessary. Planter boxes must be constructed so as to ensure that the top surface of the engineered soil media will remain level. This option may be constructed of concrete, brick, stone or other stable materials that will not warp or bend. Chemically treated wood or galvanized steel, which has the ability to contaminate stormwater, should not be used. Planter boxes must be lined with an impermeable liner on all sides, including the bottom. Due to the impermeable liner, the inside bottom of the planter box shall be designed and constructed with a cross fall, directing treated flows within the subdrain layer toward the point where subdrain exits the planter box, and subdrains shall be oriented with drain holes oriented down. These provisions will help avoid excessive stagnant water within the gravel underdrain layer. Similar to the in-ground Bioretention Facility versions, this BMP benefits from healthy plants and biological activity in the root zone. Planter boxes should be planted with appropriately selected vegetation.

Figure 5: Planter Box
Source: LA Team Effort

Overflow

An overflow route is needed in the Bioretention Facility design to bypass stored runoff from storm events larger than V_{BMP} or in the event of facility or subdrain clogging. Overflow systems must connect to an acceptable discharge point, such as a downstream conveyance system as shown in Figure 1 and Figure 4. The inlet to the overflow structure shall be elevated inside the Bioretention Facility to be flush with the ponding surface for the design capture volume (V_{BMP}) as shown in Figure 4. This will allow the design capture volume to be fully treated by the Bioretention Facility, and for larger events to safely be conveyed to downstream systems. The overflow inlet shall **not** be located in the entrance of a Bioretention Facility, as shown in Figure 6.

Underdrain Gravel and Pipes

An underdrain gravel layer and pipes shall be provided in accordance with Appendix B – Underdrains.

Figure 6: Incorrect Placement of an Overflow Inlet.

Inspection and Maintenance Schedule

The Bioretention Facility area shall be inspected for erosion, dead vegetation, soggy soils, or standing water. The use of fertilizers and pesticides on the plants inside the Bioretention Facility should be minimized.

Schedule	Activity
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris • Replace damaged grass and/or plants • Replace surface mulch layer as needed to maintain a 2-3 inch soil cover.
After storm events	• Inspect areas for ponding
Annually	• Inspect/clean inlets and outlets

Bioretention Facility Design Procedure

1) Enter the area tributary, A_T, to the Bioretention Facility.

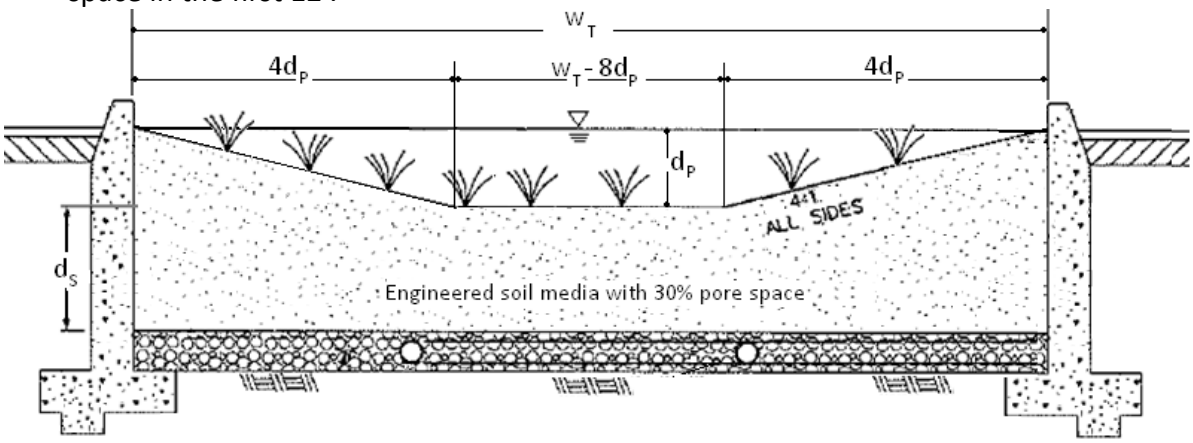
2) Enter the Design Volume, $V_{BMP,}$ determined from Section 2.1 of this Handbook.

3) Select the type of design used. There are two types of Bioretention Facility designs: the standard design used for most project sites that include side slopes, and the modified design used when the BMP is located perpendicular to the parking spaces or with planter boxes that do not use side slopes.

4) Enter the depth of the engineered soil media, d_S. The minimum depth for the engineered soil media can be 18' in limited cases, but it is recommended to use 24' or a preferred 36' to provide an adequate root zone for the chosen plant palette. Engineered soil media deeper than 36' will only get credit for the pore space in the first 36'.

5) Enter the top width of the Bioretention Facility.

6) Calculate the total effective depth, d_E, within the Bioretention Facility. The maximum allowable pore space of the soil media is 30% while the maximum allowable pore space for the gravel layer is 40%. Gravel layer deeper than 12' will only get credit for the pore space in the first 12'.



a. For the design with side slopes the following equation shall be used to determine the total effective depth. Where, d_P is the depth of ponding within the basin.

$$d_E(\text{ft}) = \frac{0.3 \times \left[\left(w_T(\text{ft}) \times d_S(\text{ft})\right) + 4\left(d_P(\text{ft})\right)^2\right] + 0.4 \times 1(\text{ft}) + d_P(\text{ft})\left[4d_P(\text{ft}) + \left(w_T(\text{ft}) - 8d_P(\text{ft})\right)\right]}{w_T(\text{ft})}$$

This above equation can be simplified if the maximum ponding depth of 0.5' is used. The equation below is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = (0.3 \times d_S(\text{ft}) + 0.4 \text{ x } 1(\text{ft})) - \left(\frac{0.7\ (\text{ft}^2)}{w_T(\text{ft})}\right) + 0.5(\text{ft})$$

b. For the design without side slopes the following equation shall be used to determine the total effective depth:

$$d_E(\text{ft}) = d_P(\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

The equation below, using the maximum ponding depth of 0.5', is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = 0.5\ (\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

7) Calculate the minimum surface area, A_M, required for the Bioretention Facility. This does not include the curb surrounding the Bioretention Facility or side slopes.

$$A_M(\text{ft}^2) = \frac{V_{BMP}(\text{ft}^3)}{d_E\ (\text{ft})}$$

8) Enter the proposed surface area. This area shall not be less than the minimum required surface area.

9) Verify that side slopes are no steeper than 4:1 in the standard design, and are not required in the modified design.

10) Provide the diameter, minimum 6 inches, of the perforated underdrain used in the Bioretention Facility. See Appendix B for specific information regarding perforated pipes.

11) Provide the slope of the site around the Bioretention Facility, if used. The maximum slope is 3 percent for a standard design.

12) Provide the check dam spacing, if the site around the Bioretention Facility is sloped.

13) Describe the vegetation used within the Bioretention Facility.

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Urbonas, Ben R. Stormwater Sand Filter Sizing and Design: A Unit Operations Approach. Denver: Urban Drainage and Flood Control District, 2002.

Appendix 6: “As-Built” Drawings

Insert “As-Builts” Here When Available

Appendix 7: Manufacturer Information

Brochures, Manuals, and Maintenance Requirements

Appendix 8: Service Agreement Information

Insert Contractor Information (if any)

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

3.5 Bioretention Facility

Type of BMP	LID – Bioretention
Treatment Mechanisms	Infiltration, Evapotranspiration, Evaporation, Biofiltration
Maximum Drainage Area	This BMP is intended to be integrated into a project's landscaped area in a distributed manner. Typically, contributing drainage areas to Bioretention Facilities range from less than 1 acre to a maximum of around 10 acres.
Other Names	Rain Garden, Bioretention Cell, Bioretention Basin, Biofiltration Basin, Landscaped Filter Basin, Porous Landscape Detention

Description

Bioretention Facilities are shallow, vegetated basins underlain by an engineered soil media. Healthy plant and biological activity in the root zone maintain and renew the macro-pore space in the soil and maximize plant uptake of pollutants and runoff. This keeps the Best Management Practice (BMP) from becoming clogged and allows more of the soil column to function as both a sponge (retaining water) and a highly effective and self-maintaining biofilter. In most cases, the bottom of a Bioretention Facility is unlined, which also provides an opportunity for infiltration to the extent the underlying onsite soil can accommodate. When the infiltration rate of the underlying soil is exceeded, fully biotreated flows are discharged via underdrains. Bioretention Facilities therefore will inherently achieve the maximum feasible level of infiltration and evapotranspiration and achieve the minimum feasible (but highly biotreated) discharge to the storm drain system.

Siting Considerations

These facilities work best when they are designed in a relatively level area. Unlike other BMPs, Bioretention Facilities can be used in smaller landscaped spaces on the site, such as:

- ✓ Parking islands
- ✓ Medians
- ✓ Site entrances

Landscaped areas on the site (such as may otherwise be required through minimum landscaping ordinances), can often be designed as Bioretention Facilities. This can be accomplished by:

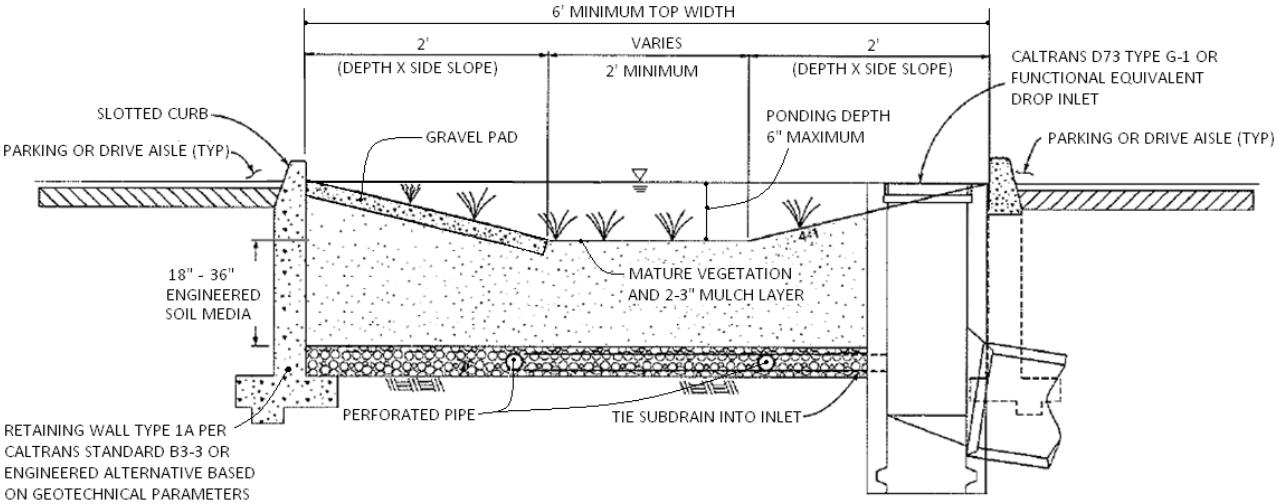
- *Depressing* landscaped areas below adjacent impervious surfaces, rather than elevating those areas
- Grading the site to direct runoff from those impervious surfaces *into* the Bioretention Facility, rather than away from the landscaping
- Sizing and designing the depressed landscaped area as a Bioretention Facility as described in this Fact Sheet

Bioretention Facilities should however not be used downstream of areas where large amounts of sediment can clog the system. Placing a Bioretention Facility at the toe of a steep slope should also be avoided due to the potential for clogging the engineered soil media with erosion from the slope, as well as the potential for damaging the vegetation.

Design and Sizing Criteria

The recommended cross section necessary for a Bioretention Facility includes:

- Vegetated area
- 18' minimum depth of engineered soil media
- 12' minimum gravel layer depth with 6' perforated pipes (added flow control features such as orifice plates may be required to mitigate for HCOC conditions)



While the 18-inch minimum engineered soil media depth can be used in some cases, it is recommended to use 24 inches or a preferred 36 inches to provide an adequate root zone for the chosen plant palate. Such a design also provides for improved removal effectiveness for nutrients. The recommended ponding depth inside of a Bioretention Facility is 6 inches; measured from the flat bottom surface to the top of the water surface as shown in Figure 1.

Because this BMP is filled with an engineered soil media, pore space in the soil and gravel layer is assumed to provide storage volume. However, several considerations must be noted:

- Surcharge storage above the soil surface (6 inches) is important to assure that design flows do not bypass the BMP when runoff exceeds the soil's absorption rate.
- In cases where the Bioretention Facility contains engineered soil media deeper than 36 inches, the pore space within the engineered soil media can only be counted to the 36-inch depth.
- A maximum of 30 percent pore space can be used for the soil media whereas a maximum of 40 percent pore space can be use for the gravel layer.

Figure 1: Standard Layout for a Bioretention Facility

Engineered Soil Media Requirements

The engineered soil media shall be comprised of 85 percent mineral component and 15 percent organic component, by volume, drum mixed prior to placement. The mineral component shall be a Class A sandy loam topsoil that meets the range specified in Table 1 below. The organic component shall be nitrogen stabilized compost[1], such that nitrogen does not leach from the media.

Table 1: Mineral Component Range Requirements

Percent Range	Component
70-80	Sand
15-20	Silt
5-10	Clay

The trip ticket, or certificate of compliance, shall be made available to the inspector to prove the engineered mix meets this specification.

Vegetation Requirements

Vegetative cover is important to minimize erosion and ensure that treatment occurs in the Bioretention Facility. The area should be designed for at least 70 percent mature coverage throughout the Bioretention Facility. To prevent the BMP from being used as walkways, Bioretention Facilities shall be planted with a combination of small trees, densely planted shrubs, and natural grasses. Grasses shall be native or ornamental; preferably ones that do not need to be mowed. The application of fertilizers and pesticides should be minimal. To maintain oxygen levels for the vegetation and promote biodegradation, it is important that vegetation not be completely submerged for any extended period of time. Therefore, a maximum of 6 inches of ponded water shall be used in the design to ensure that plants within the Bioretention Facility remain healthy.

A 2 to 3-inch layer of standard shredded aged hardwood mulch shall be placed as the top layer inside the Bioretention Facility. The 6-inch ponding depth shown in Figure 1 above shall be measured from the top surface of the 2 to 3-inch mulch layer.

Curb Cuts

To allow water to flow into the Bioretention Facility, 1-foot-wide (minimum) curb cuts should be placed approximately every 10 feet around the perimeter of the Bioretention Facility. Figure 2 shows a curb cut in a Bioretention Facility. Curb cut flow lines must be at or above the V_{BMP} water surface level.

[1] For more information on compost, visit the US Composting Council website at: http://compostingcouncil.org/

Figure 2: Curb Cut located in a Bioretention Facility

To reduce erosion, a gravel pad shall be placed at each inlet point to the Bioretention Facility. The gravel should be 1- to 1.5-inch diameter in size. The gravel should overlap the curb cut opening a minimum of 6 inches. The gravel pad inside the Bioretention Facility should be flush with the finished surface at the curb cut and extend to the bottom of the slope.

In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet. See Figure 3.

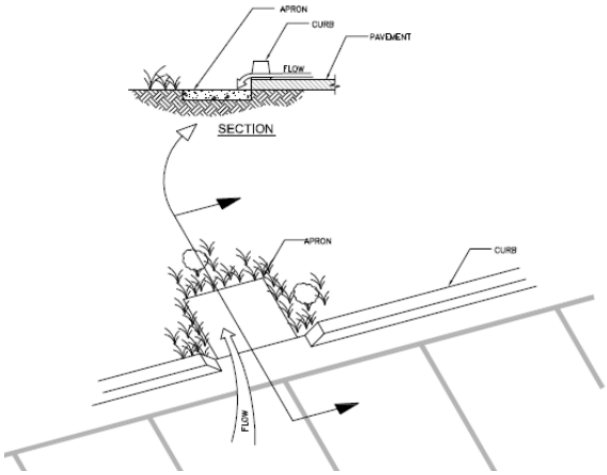


Figure 3: Apron located in a Bioretention Facility

Terracing the Landscaped Filter Basin

It is recommended that Bioretention Facilities be level. In the event the facility site slopes and lacks proper design, water would fill the lowest point of the BMP and then discharge from the basin without being treated. To ensure that the water will be held within the Bioretention Facility on sloped sites, the BMP must be terraced with nonporous check dams to provide the required storage and treatment capacity.

The terraced version of this BMP shall be used on non-flat sites with no more than a 3 percent slope. The surcharge depth cannot exceed 0.5 feet, and side slopes shall not exceed 4:1. Table 2 below shows the spacing of the check dams, and slopes shall be rounded up (i.e., 2.5 percent slope shall use 10' spacing for check dams).

Table 2: Check Dam Spacing

6" Check Dam Spacing	
Slope	**Spacing**
1%	*25'*
2%	*15'*
3%	*10'*

Roof Runoff

Roof downspouts may be directed towards Bioretention Facilities. However, the downspouts must discharge onto a concrete splash block to protect the Bioretention Facility from erosion.

Retaining Walls

It is recommended that Retaining Wall Type 1A, per Caltrans Standard B3-3 or equivalent, be constructed around the entire perimeter of the Bioretention Facility. This practice will protect the sides of the Bioretention Facility from collapsing during construction and maintenance or from high service loads adjacent to the BMP. Where such service loads would not exist adjacent to the BMP, an engineered alternative may be used if signed by a licensed civil engineer.

Side Slope Requirements

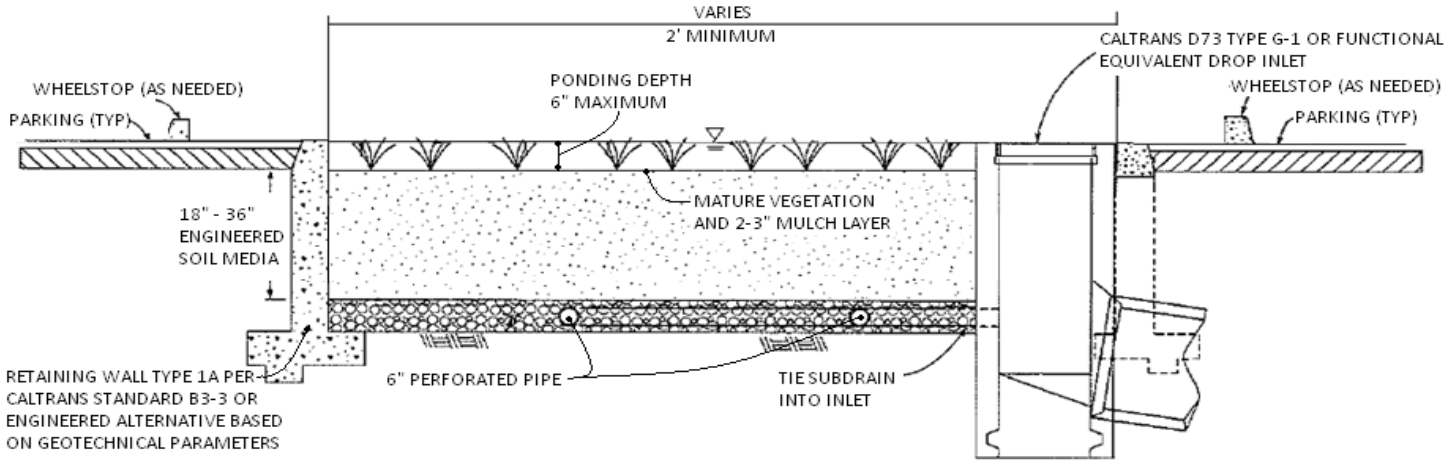
Bioretention Facilities Requiring Side Slopes

The design should assure that the Bioretention Facility does not present a tripping hazard. Bioretention Facilities proposed near pedestrian areas, such as areas parallel to parking spaces or along a walkway, must have a gentle slope to the bottom of the facility. Side slopes inside of a Bioretention Facility shall be 4:1. A typical cross section for the Bioretention Facility is shown in Figure 1.

Bioretention Facilities Not Requiring Side Slopes

Where cars park perpendicular to the Bioretention Facility, side slopes are not required. A 6-inch maximum drop may be used, and the Bioretention Facility must be planted with trees and shrubs to prevent pedestrian access. In this case, a curb is not placed around the Bioretention Facility,

but wheel stops shall be used to prevent vehicles from entering the Bioretention Facility, as shown in Figure 4.



Planter Boxes

Bioretention Facilities can also be placed above ground as planter boxes. Planter boxes must have a minimum width of 2 feet, a maximum surcharge depth of 6 inches, and no side slopes are necessary. Planter boxes must be constructed so as to ensure that the top surface of the engineered soil media will remain level. This option may be constructed of concrete, brick, stone or other stable materials that will not warp or bend. Chemically treated wood or galvanized steel, which has the ability to contaminate stormwater, should not be used. Planter boxes must be lined with an impermeable liner on all sides, including the bottom. Due to the impermeable liner, the inside bottom of the planter box shall be designed and constructed with a cross fall, directing treated flows within the subdrain layer toward the point where subdrain exits the planter box, and subdrains shall be oriented with drain holes oriented down. These provisions will help avoid excessive stagnant water within the gravel underdrain layer. Similar to the in-ground Bioretention Facility versions, this BMP benefits from healthy plants and biological activity in the root zone. Planter boxes should be planted with appropriately selected vegetation.

Figure 5: Planter Box
Source: LA Team Effort

Overflow

An overflow route is needed in the Bioretention Facility design to bypass stored runoff from storm events larger than V_{BMP} or in the event of facility or subdrain clogging. Overflow systems must connect to an acceptable discharge point, such as a downstream conveyance system as shown in Figure 1 and Figure 4. The inlet to the overflow structure shall be elevated inside the Bioretention Facility to be flush with the ponding surface for the design capture volume (V_{BMP}) as shown in Figure 4. This will allow the design capture volume to be fully treated by the Bioretention Facility, and for larger events to safely be conveyed to downstream systems. The overflow inlet shall **not** be located in the entrance of a Bioretention Facility, as shown in Figure 6.

Underdrain Gravel and Pipes

An underdrain gravel layer and pipes shall be provided in accordance with Appendix B – Underdrains.

Figure 6: Incorrect Placement of an Overflow Inlet.

Inspection and Maintenance Schedule

The Bioretention Facility area shall be inspected for erosion, dead vegetation, soggy soils, or standing water. The use of fertilizers and pesticides on the plants inside the Bioretention Facility should be minimized.

Schedule	Activity
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris • Replace damaged grass and/or plants • Replace surface mulch layer as needed to maintain a 2-3 inch soil cover.
After storm events	• Inspect areas for ponding
Annually	• Inspect/clean inlets and outlets

Bioretention Facility Design Procedure

1) Enter the area tributary, A_T, to the Bioretention Facility.

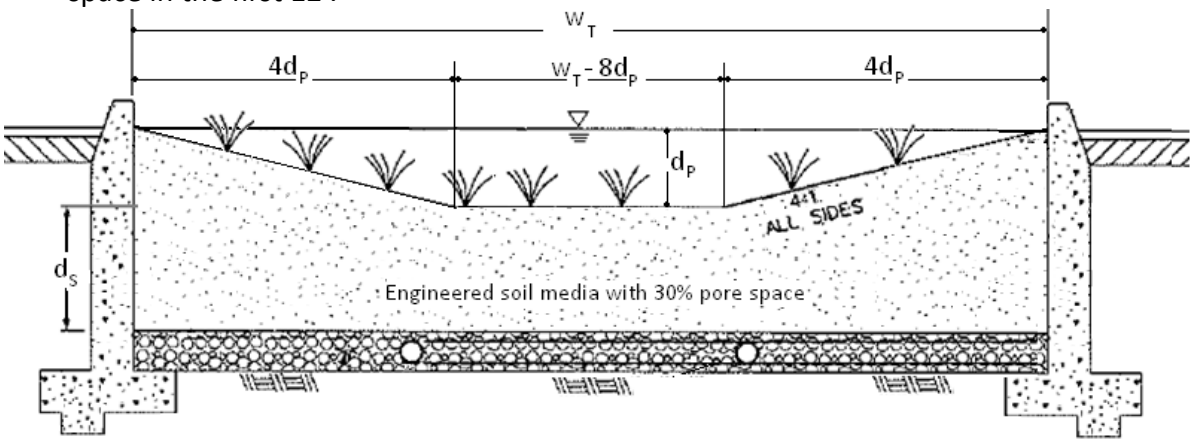
2) Enter the Design Volume, $V_{BMP,}$ determined from Section 2.1 of this Handbook.

3) Select the type of design used. There are two types of Bioretention Facility designs: the standard design used for most project sites that include side slopes, and the modified design used when the BMP is located perpendicular to the parking spaces or with planter boxes that do not use side slopes.

4) Enter the depth of the engineered soil media, d_S. The minimum depth for the engineered soil media can be 18' in limited cases, but it is recommended to use 24' or a preferred 36' to provide an adequate root zone for the chosen plant palette. Engineered soil media deeper than 36' will only get credit for the pore space in the first 36'.

5) Enter the top width of the Bioretention Facility.

6) Calculate the total effective depth, d_E, within the Bioretention Facility. The maximum allowable pore space of the soil media is 30% while the maximum allowable pore space for the gravel layer is 40%. Gravel layer deeper than 12' will only get credit for the pore space in the first 12'.



a. For the design with side slopes the following equation shall be used to determine the total effective depth. Where, d_P is the depth of ponding within the basin.

$$d_E(\text{ft}) = \frac{0.3 \times \left[\left(w_T(\text{ft}) \times d_S(\text{ft})\right) + 4\left(d_P(\text{ft})\right)^2\right] + 0.4 \times 1(\text{ft}) + d_P(\text{ft})\left[4d_P(\text{ft}) + \left(w_T(\text{ft}) - 8d_P(\text{ft})\right)\right]}{w_T(\text{ft})}$$

This above equation can be simplified if the maximum ponding depth of 0.5' is used. The equation below is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = (0.3 \times d_S(\text{ft}) + 0.4 \text{ x } 1(\text{ft})) - \left(\frac{0.7\ (\text{ft}^2)}{w_T(\text{ft})}\right) + 0.5(\text{ft})$$

b. For the design without side slopes the following equation shall be used to determine the total effective depth:

$$d_E(\text{ft}) = d_P(\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

The equation below, using the maximum ponding depth of 0.5', is used on the worksheet to find the minimum area required for the Bioretention Facility:

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7) Calculate the minimum surface area, A_M, required for the Bioretention Facility. This does not include the curb surrounding the Bioretention Facility or side slopes.

$$A_M(\text{ft}^2) = \frac{V_{BMP}(\text{ft}^3)}{d_E\ (\text{ft})}$$

8) Enter the proposed surface area. This area shall not be less than the minimum required surface area.

9) Verify that side slopes are no steeper than 4:1 in the standard design, and are not required in the modified design.

10) Provide the diameter, minimum 6 inches, of the perforated underdrain used in the Bioretention Facility. See Appendix B for specific information regarding perforated pipes.

11) Provide the slope of the site around the Bioretention Facility, if used. The maximum slope is 3 percent for a standard design.

12) Provide the check dam spacing, if the site around the Bioretention Facility is sloped.

13) Describe the vegetation used within the Bioretention Facility.

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Building & Grounds Maintenance SC-41

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	
Organics	

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Encourage proper lawn management and landscaping, including use of native vegetation.

CASQA California Stormwater Quality Association

- Encourage use of Integrated Pest Management techniques for pest control.
- Encourage proper onsite recycling of yard trimmings.
- Recycle residual paints, solvents, lumber, and other material as much as possible.

Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement.

Landscaping Activities

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.
- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. If directed off-site, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- Store toxic material under cover during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures when soils are exposed.
- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Consider an alternative approach when bailing out muddy water: do not put it in the storm drain; pour over landscaped areas.
- Use hand weeding where practical.

Fertilizer and Pesticide Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- Use less toxic pesticides that will do the job when applicable. Avoid use of copper-based pesticides if possible.
- Do not use pesticides if rain is expected.
- Do not mix or prepare pesticides for application near storm drains.
- Use the minimum amount needed for the job.
- Calibrate fertilizer distributors to avoid excessive application.
- Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.
- Apply pesticides only when wind speeds are low.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Dispose of empty pesticide containers according to the instructions on the container label.

- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.

Training

- Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- Familiarize employees with the Spill Prevention Control and Countermeasure Plan.
- Clean up spills immediately.

Other Considerations

Alternative pest/weed controls may not be available, suitable, or effective in many cases.

Requirements

Costs

- Cost will vary depending on the type and size of facility.
- Overall costs should be low in comparison to other BMPs.

Maintenance

Sweep paved areas regularly to collect loose particles. Wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and between flushes may accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Site Design & Landscape Planning SD-10

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

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Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.

- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.

- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.

- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.

- Promote natural vegetation by using parking lot islands and other landscaped areas.

- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.

- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “ redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Roof Runoff Controls SD-11

Rain Garden

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain

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barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say ¼ to ½ inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Dry wells and Infiltration Trenches

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

Pop-up Drainage Emitter

Roof downspouts can be directed to an underground pipe that daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Supplemental Information

Examples

- City of Ottawa's Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, "Low-Impact Development", January/February 2003. www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD. www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition

Efficient Irrigation SD-12

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

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- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

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Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Street Sweeping and Vacuuming SE-7

Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused, and perhaps save money.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking should be swept or vacuumed on a daily basis.
- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.

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- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from $58/hour (3 yd^3 hopper) to $88/hour (9 yd^3 hopper), plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

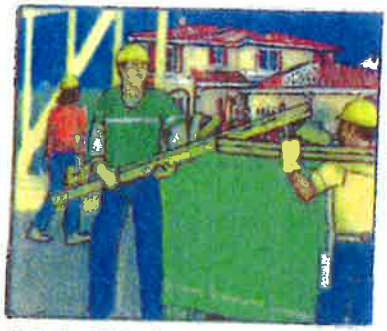
Labor Surcharge and Equipment Rental Rates, State of California Department of Transportation (Caltrans), April 1, 2002 – March 31, 2003.

STORMWATER Pollution Prevention

CONSTRUCTION

Cement wash, sediment, vehicle fluids, dust and hazardous debris from construction sites often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.

Store Materials Safely
Keep construction materials and debris away from the street, gutter and storm drains. Cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.

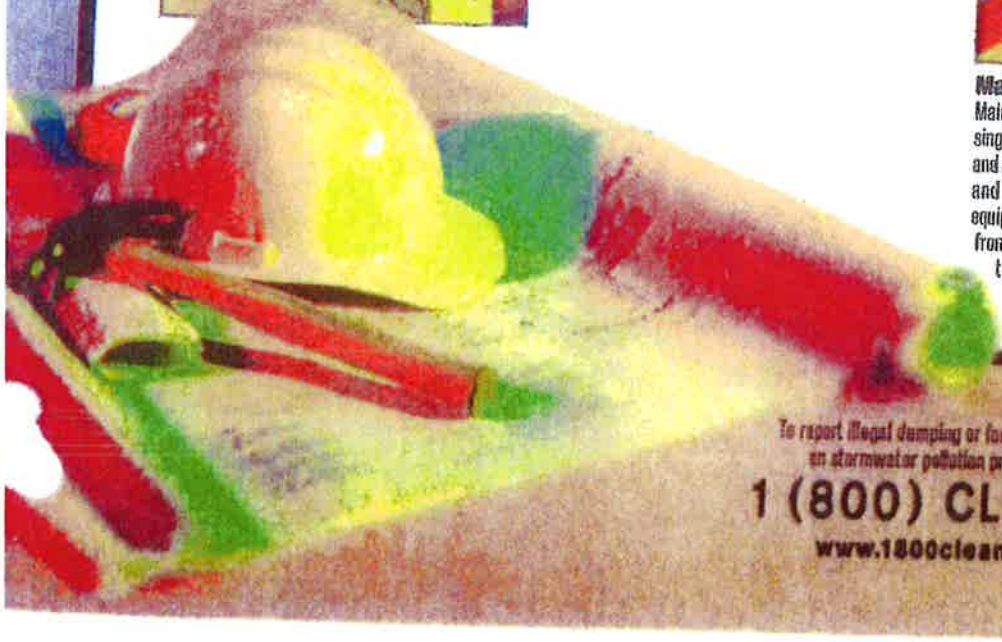


Ordering Materials & Recycling Waste
Reduce waste by ordering only the amounts of materials needed for the job. Use recycled or recyclable materials whenever possible. You can recycle broken asphalt, concrete, wood, and cleared vegetation. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. For recycling and disposal information, call (909) 386-8401.

Cleaning & Preventing Spills
Use a drip pan and funnel when draining or pouring fluids. Sweep up dry spills, instead of hosing. Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust. To report serious spills, call 911.

Preventing Erosion
Avoid excavation or grading during wet weather. Plant temporary vegetation or add hydromulch on slopes where construction is not immediately planned, and permanent vegetation once excavation and grading are complete. Construct diversion dikes to channel runoff to a detention basin and around the construction site. Channels can be lined with grass or roughened pavement to reduce runoff velocity.

Maintaining Vehicles & Equipment
Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutter and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks, and prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, brake and radiator fluids.



To report illegal dumping or for more information on stormwater pollution prevention, call:

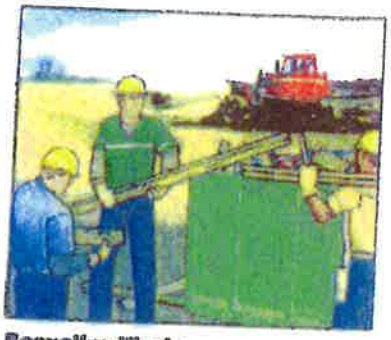
1 (800) CLEANUP

www.1800cleanup.org

STORMWATER Pollution Prevention

EXCAVATION AND GRADING

Sediment, cement wash, asphalt and vehicle fluids from soil excavation and grading often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.



Recycling Waste
Recycle broken asphalt, concrete, wood, and cleared vegetation whenever possible. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. For recycling and disposal information, call (909) 386-8401.

Maintaining Vehicles & Equipment
Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutters and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks. Use gravel approaches where truck traffic is heavy to reduce soil compaction and limit the tracking of sediment into the street.

Cleaning & Preventing Spills
Use a drip pan and funnel when draining or pouring fluids. Sweep up dry spills, instead of hosing. Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust. Prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, brake and radiator fluids. To report serious spills, call 911.

Storing Materials
Keep construction materials and debris away from the street, gutter and storm drains. Cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.

Preventing Erosion
Avoid excavation or grading during wet weather. Plant temporary vegetation on slopes where construction is not immediately planned, and permanent vegetation once excavation and grading are complete. Construct diversion dikes to channel runoff. Channels can be lined with grass or roughened pavement to reduce runoff velocity.

To report illegal dumping or for more information on stormwater pollution prevention, call

1 (800) CLEANUP

www.1800cleanup.org

STORMWATER Pollution Prevention

FRESH CONCRETE & MORTAR APPLICATION

Cement wash, sediment, vehicle fluids, dust and hazardous debris from construction sites often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.

Storing Materials

Keep construction materials and debris away from the street, gutter and storm drains. Secure open bags of cement and cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.

Ordering Materials & Recycling Waste

Reduce waste by ordering only the amounts of materials needed for the job. Use recycled or recyclable materials whenever possible. When breaking up paving, recycle the pieces at a crushing company. You can also recycle broken asphalt, concrete, wood, and cleared vegetation. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. Call (909) 386-8401 for recycling and disposal information.

During Construction

Schedule excavation and grading during dry weather. Prevent mortar and cement from entering the street and storm drains by placing erosion controls. Setup small mixers on tarps or drop cloths, for easy cleanup of debris. Never bury waste material. Recycle or dispose of it as hazardous waste.

Cleaning Up

Wash concrete dust onto designated dirt areas, not down driveways or into the street or storm drains. Wash out concrete mixers and equipment in specified washout areas, where water can flow into a containment pond. Cement washwater can be recycled by pumping it back into cement mixers for reuse. Never dispose of cement washout into driveways, streets, gutters, storm drains or drainage ditches.

To report illegal dumping or for more information on stormwater pollution prevention, call:

1 (800) CLEANUP

www.1800cleanup.org

STORMWATER Pollution Prevention

ROADWORK AND PAVING

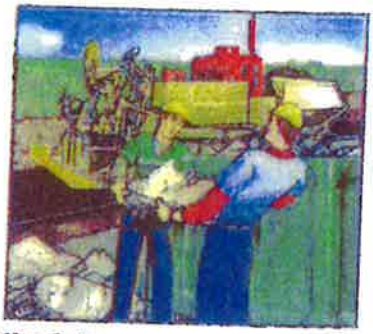
Asphalt, saw-cut slurry and excavated materials from road paving, surfacing and pavement removal often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.

Preventing Erosion
Schedule excavation and grading work during dry weather. Develop and implement erosion and sediment control plans for excavated embankments. Cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.

During Construction
Cover catch basins and maintenance holes when applying seal coat, slurry seal or fog seal. Use check dams, ditches or berms around excavations, and avoid over applying water for dust control. Never wash excess materials from exposed aggregate or concrete into the street, gutter or a storm drain.

Maintaining Vehicles & Equipment
Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutter and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks, and prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, brake and radiator fluids.

Asphalt & Concrete Removal
Barricade storm drain openings during saw-cutting, and recycle broken up pavement at a crushing company. For recycling information, call (909) 386-8401.



Cleaning & Preventing Spills
Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust. Sweep up dry spills, instead of hosing. Prevent spills from paver machines by using drip pans, or by placing absorbent materials like cloths or rags under the machines when not in use. To report serious spills, call 911.

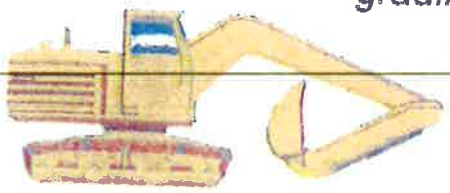
To report illegal dumping or for more information on stormwater pollution prevention, call:

1 (800) CLEANUP

www.1800cleanup.org

EXCAVATION & GRADING OPERATIONS

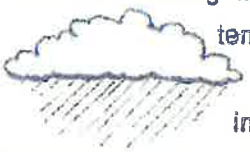
Sediment, cement wash, asphalt, and motor oil from soil excavation and grading operations often make their way into the San Bernardino County storm drain system and DO NOT GET TREATED before reaching the Santa Ana River. These wastes pollute our drinking water, and make our waters unhealthy and unsafe for people and wildlife.



Follow these practices to help prevent stormwater pollution...

Erosion Prevention...

Reduce erosion by avoiding excavation or grading activities during wet weather, and by planting



temporary vegetation on slopes where construction is not immediately planned. Plant permanent vegetation as soon as possible, once excavation and grading activities are complete. Diversion dikes can be constructed to channel runoff around the site; channels can be lined with grass or roughened pavement to reduce runoff velocity. For information on erosion control, call 799-7407.

General Business Practices...

Cover exposed piles of soil and other construction materials with plastic sheeting to prevent contact with rain water.

Recycling...

Recycle broken asphalt, concrete, wood, and cleared vegetation whenever possible. Unrecyclable materials must be taken to an appropriate landfill or disposed of as hazardous waste. For recycling or disposal information, call 386-8401.

Equipment Maintenance...

Maintain all vehicles and equipment by inspecting them frequently for leaks. Also, conduct maintenance and refueling at one location -- away from storm drains, and perform major equipment repairs and washings off site. Finally, use gravel approaches where truck traffic is frequent to reduce soil compaction and limit the tracking of sediment into the streets.

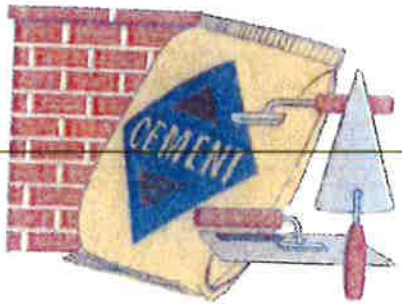
Spills...

Avoid accidental spills by using a drip pan and funnel when draining or pouring fluids. Be ready for unexpected spills by preparing and using easy to find

spill containment and cleanup kits. Kits should include safety equipment and cleanup materials such as kitty litter, sawdust or commeal. Furthermore, prevent leaks from stored vehicles by draining gas, hydraulic oil, and transmission, brake & radiator fluid. REMEMBER: Never hose down dirty surfaces. To report serious spills, call 1-800-33-TOXIC.

For more information, call your city's stormwater representative

FRESH CONCRETE & MORTAR APPLICATION



Cement, cement wash, gravel, asphalt, solvents, and motor oil from fresh concrete and mortar activities often make their way into the San Bernardino County storm drain system and DO NOT GET TREATED before reaching the Santa Ana River. These wastes pollute our drinking water, and make our waters unhealthy and unsafe for people and wildlife.

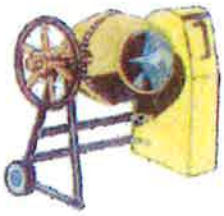
Follow these practices to help prevent stormwater pollution...

General Business Practices...

Schedule excavation and grading work during dry weather, and in case it rains, prevent materials from contacting stormwater by storing them under cover. Also, secure open bags of cement to keep wind-blown cement powder away from streets, gutters and storm drains.

During Construction...

Prevent mortar and cement from entering the storm drains by placing erosion controls (i.e., berms or temporary vegetation) down-slope to capture runoff. When breaking up paving, be sure to pick up all pieces and recycle them at a crushing company; small amounts of excess dry concrete, grout and mortar can be disposed of in the trash. Setup small mixers on tarps or heavy drop cloths to allow for easy cleanup of debris. REMEMBER: Never bury waste material -- recycle or dispose of it as hazardous waste. Call 386-8401 for recycling and disposal information.



Handling Materials & Wastes...

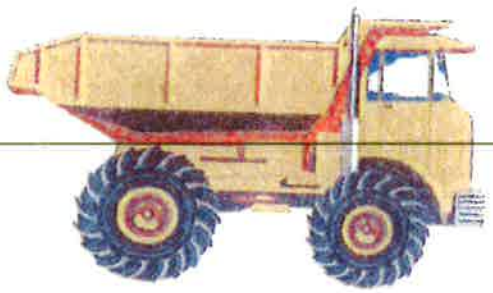
Minimize wastes when ordering materials by ordering only the amounts needed to complete the job. Whenever possible, use recycled or recyclable materials. Recycle broken asphalt, concrete, wood, and cleared vegetation. Unrecyclable materials must be taken to an appropriate landfill or disposed of as hazardous waste. For recycling and disposal information, call 386-8401.

Cleaning up...

When cleaning up after driveway or sidewalk construction, wash concrete dust onto designated dirt areas, not down the driveway or into the street or storm drain. Also, wash out concrete mixers and equipment only in specified wash-out areas, where the water flows into containment ponds. Cement washwater can be recycled by pumping it back into cement mixers for reuse. REMEMBER: Never dispose of cement washout into driveways, streets, gutters, storm drains or drainage ditches.

For more information, call your city's stormwater representative

GENERAL CONSTRUCTION



Soil, cement wash, asphalt and motor oil from construction sites often make their way into the San Bernardino County storm drain system and DO NOT GET TREATED before reaching the Santa Ana River. These wastes pollute our drinking water, and make our waters unhealthy and unsafe for people and wildlife.

Follow these practices to help prevent stormwater pollution...

General Business Practices...

Cover exposed piles of soil and other construction materials with plastic sheeting to prevent contact with rain water.

Erosion Prevention...

Reduce erosion by avoiding excavation or grading activities during wet weather, and by planting temporary vegetation on slopes where construction is not immediately planned. Plant permanent vegetation as soon as possible, once excavation and grading activities are complete. Diversion dikes can be constructed to channel runoff around the site; channels can be lined with grass or roughened pavement to reduce runoff velocity. For information on erosion control, call 799-7407.

Equipment Maintenance...

Maintain all vehicles and equipment by inspecting them frequently for leaks. Also, conduct maintenance and refueling at one location -- away from storm drains, and perform major equipment repairs and washings off site.

Handling Materials & Waste...

Minimize wastes when ordering materials by ordering only the amounts needed to complete the job. Whenever possible, use recycled or recyclable materials. Recycle broken asphalt, concrete, wood, and cleared vegetation. Unrecyclable materials must be taken to an appropriate landfill or disposed of as hazardous waste. For recycling and disposal information, call 386-8401.

Spills...

Avoid accidental spills by using a drip pan and funnel when draining or pouring fluids. Be ready for unexpected spills by preparing and using easy to find spill containment and cleanup kits. Kits should include safety equipment and cleanup materials such as kitty litter, sawdust or cornmeal. Furthermore, prevent leaks from stored vehicles by draining gas, hydraulic oil, and transmission, brake & radiator fluid. REMEMBER: Never hose down dirty surfaces; instead, sweep regularly. To report serious spills, call 1-800-33-TOXIC.

For more information, call your city's stormwater representative

ROADWORK & PAVING

Asphalt, saw-cut slurry, and excavated materials from Road paving, surfacing and pavement removal operations often make their way into the San Bernardino County storm drain system and DO NOT GET TREATED before reaching the Santa Ana River. These wastes pollute our drinking water, and make our waters unhealthy and unsafe for people and wildlife.

Follow these practices to help prevent stormwater pollution...

During Construction...

Cover catch basins and maintenance holes when applying seal coat, slurry seal, fog seal, etc. Use check dams, ditches or berms around excavations, and avoid over-application of water for dust control. REMEMBER: Never wash excess materials from exposed aggregate or concrete into a street, gutter, or storm drain; collect and recycle them.

Asphalt & Concrete Removal...

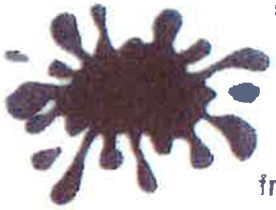
Barricade storm drain openings during saw-cutting, and after breaking up paving, be sure to remove all chunks and pieces and recycle them at a crushing company. For recycling information, call 386-8401.

Equipment Maintenance...

Maintain all vehicles and equipment by inspecting them frequently for leaks. Also, conduct maintenance and refueling at one location -- away from storm drains, and perform major equipment repairs and washings off site.

Spills...

Be ready for unexpected spills by preparing and using spill containment and cleanup kits. Kits should include



safety equipment and cleanup materials such as kitty litter, sawdust or cornmeal. Prevent drips from paver machines by catching fluids with drip pans or by placing absorbent material (cloth, rags, etc....) underneath the machines when they're not in use. To report serious spills, call 1-800-33-TOXIC.

General Business Practices...

Schedule excavation and grading work during dry weather, and develop and implement erosion and sediment control plans for excavated embankments. In

case it rains, cover exposed piles of soil and other construction materials with plastic sheeting to prevent contact with rain water.

For more information, call your city's stormwater representative